94th Congress
1st Session

COMMITTEE PRINT

ANALYSES OF EFFECTS OF LIMITED NUCLEAR WARFARE

PREPARED FOR

SUBCOMMITTEE ON ARMS CONTROL, INTERNATIONAL ORGANIZATIONS AND SECURITY AGREEMENTS

OF THE

COMMITTEE ON FOREIGN RELATIONS
UNITED STATES SENATE

SEPTEMBER 1975

Printed for the use of the Committee on Foreign Relations

U.S. GOVERNMENT PRINTING OFFICE
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U.S. SENATE,
COMMITTEE ON FOREIGN RELATIONS,
Washington, D.C., September 11, 1975.

Hon. JOHN SPARKMAN,
Chairman, Committee on Foreign Relations,
U.S. Senate,
Washington, D.C.

DEAR MR. CHAIRMAN: On September 11, 1974, the Arms Control Subcommittee met in executive session with Secretary of Defense James R. Schlesinger to look into the casualties and destruction which might be expected to result from nuclear attacks against military installations in the United States. This hearing, which was later sanitized and made public was a continuation of the Subcommittee's investigation into the implications of the flexible response doctrine enunciated by Secretary Schlesinger.

In connection with the hearing, the Secretary provided the Committee with detailed unclassified estimates of the probable damage of various levels of counterforce attacks against the United States. These estimates were provided to the Office of Technology Assessment for evaluation. The Office of Technology Assessment convened an ad hoc panel of experts to consider the Defense Department material. In response, the panel suggested both short-term and detailed analyses the Defense Department might perform in order to have more reliable estimates of the potential destruction of counterforce attacks.

The additional work was requested, and the Department of Defense worked closely with the Subcommittee staff to develop the additional analysis requested.

At the same time, members of the ad hoc panel, upon request, related the estimates of the possible effects of limited nuclear warfare envisioned in the flexible response doctrine to the Vladivostok accords and a possible final SALT II agreement.

In view of the importance of these issues, I am requesting that the Committee on Foreign Relations print the two reports of the ad hoc panel and the new Department of Defense analysis, together with the pertinent correspondence.

The work done so far provides a valuable foundation for further efforts to better develop a national strategy rationally based upon a clear understanding of the implications and effects of nuclear war. I intend to have the Subcommittee continue with this.

I wish to express my deep appreciation to the members of the ad hoc panel for their valuable assistance, to Secretary of Defense Schlesinger and his staff for the cooperation given in the course of this work and to the ranking minority member of the Committee, Senator Case, at whose behest this effort was undertaken.

Sincerely,

STUART SYMINGTON,
Chairman, Subcommittee on Arms Control,
International Organizations and Security Agreements.

U.S. SENATE,
COMMITTEE ON FOREIGN RELATIONS,
Washington, D.C., September 12, 1974.

Hon. J. WILLIAM FULBRIGHT,
Chairman, Committee on Foreign Relations,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: On September 11 the Arms Control Subcommittee received a briefing from Secretary of Defense Schlesinger on his estimates of the U.S. casualties to be expected from less than all-out nuclear attacks against U.S. military targets.

The object of this subcommittee session was to begin an examination of one of the critical assumptions underlying the Administration's recent doctrinal shift on the use and development of so-called "counterforce" weapons—that is, the belief that nuclear exchanges limited to military targets would result in relatively few civilian casualties.

As is described in the attached correspondence from Senator Case, there has been sharp disagreement among analysts as to the accuracy of Defense Department estimates of such casualties.

In his September 11 appearance before the Arms Control Subcommittee, Secretary Schlesinger was most forthcoming in describing the principal features and limitations of current Defense Department analyses on the subject. He also outlined the analytical effort now underway in his department to assess the long-range societal consequences of various types of attacks against U.S. military targets.

It is apparent that the Defense Department has begun to give this subject the serious attention it deserves. This Committee should be prepared to respond to Secretary Schlesinger's invitation to participate in this ongoing policy analysis as an active partner. To accomplish this, the Committee should draw upon available resources to gain an independent judgement on the adequacy of the further studies that Secretary Schlesinger has underway and that are planned.

At this juncture, with U.S. strategic doctrine in the process of possible fundamental change, it would be unfortunate if this opportunity for in-depth Congressional and public examination were not taken. Mutual assured destruction, together with attendant capability to respond in kind to very small attacks, has until now been the rock upon which the United States has built its security. It therefore seems indicated that the Congress consider fully the consequences of the ranges of possible attacks against U.S. military targets, before acceding to the development of a U.S. "counterforce" capability that at its foundation presupposes and requires that such attacks entail some "acceptable" level of U.S. civilian fatalities and destruction.

In view of these considerations, we would like to enlist your support for a request for assistance from the Congressional Office of

Technology Assessment. We propose that OTA be asked by the Committee to assemble a competent and unbiased panel of experts that would carry out the following general tasks and responsibilities:

1. Conduct a critical review of current DOD estimates of casualties and damages expected to result from nuclear attacks upon military installations in the United States, to include a detailed examination of assumptions underlying such estimates as well as the scope and representative nature of attacks selected for analysis. This review should also encompass additional analyses now underway or being planned by the Defense Department.

2. Identify deficiencies and limitations of existing and planned analyses and, where indicated, develop and carry out independent analyses to provide the Congress with a comprehensive and independent understanding of the full consequences of nuclear attacks against military installations in the United States.

Your assistance in this matter will be greatly appreciated.

Sincerely,

CLIFFORD P. CASE. EDMUND S. MUSKIE,
Chairman, Subcommittee on Arms Control, International Law and Organization.

[EDITOR'S NOTE: The September 11 hearing before the Arms Control Subcommittee is reproduced as an Appendix.]

U.S. SENATE,
COMMITTEE ON FOREIGN RELATIONS,
Washington, D.C., September 19, 1974.

Hon. EDWARD M. KENNEDY,
Chairman, Technology Assessment Board,
U.S. Congress, Washington, D.C.

DEAR MR. CHAIRMAN: The Subcommittee on Arms Control, International Law and Organization of the Committee on Foreign Relations has conducted a series of hearings to explore the implications of planned changes in national strategic doctrine. The Subcommittee has been particularly concerned with the retargeting program and the concept of limited nuclear exchanges as an alternative to mutual assured destruction.

Senator Muskie, Chairman of the Subcommittee and Senator Case, ranking Minority Member, have written me suggesting that the Committee on Foreign Relations should seek a review and analysis of the accuracy of Department of Defense estimates of the potential effects of limited warfare upon United States society. I believe that a thorough, independent review and analysis, with the results made available to the public, could help achieve a better understanding of these important strategic issues.

Accordingly, on behalf of the Committee I am asking, under the provisions of the Technology Assessment Act of 1972 (P.L. 92–484, sec. 3(d)(1)), that the Office of Technology Assessment conduct the review and analysis outlined in the enclosed letter to me from Senators Muskie and Case.

I would appreciate a favorable response to this request at an early date.

Sincerely,

J. W. FULBRIGHT, *Chairman.*

Enclosure.

CONGRESS OF THE UNITED STATES,
OFFICE OF TECHNOLOGY ASSESSMENT,
Washington, D.C., March 5, 1975.

Hon. JOHN SPARKMAN,
Chairman, Committee on Foreign Relations,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: In response to your Committee's request of September 19, 1974, a panel of experts, chaired by Dr. Jerome Wiesner of the OTA Advisory Council, was convened to evaluate the task of reviewing DOD estimates of the potential effects of limited nuclear war upon United States society.

Enclosed is a copy of the panel's report summarizing the results of this evaluation.

If you have any questions about the report or its recommendations, please do not hesitate to get in touch with OTA's Director, Mr. Emilio Q. Daddario.

Best regards,
Sincerely,

OLIN E. TEAGUE,
Chairman, Technology Assessment Board.

Enclosure.

CONGRESS OF THE UNITED STATES,
OFFICE OF TECHNOLOGY ASSESSMENT,
Washington, D.C., February 25, 1975.

MR. EMILIO Q. DADDARIO,
Director, Office of Technology Assessment, Congress of the United States,
Washington, D.C.

DEAR MR. DADDARIO. The panel that I was asked to convene to provide advice on how OTA could respond to a request from the Senate Foreign Relations Committee for a "critical review of current DOD estimates of casualties and damages expected to result from nuclear attacks upon military installations in the U.S.," has completed its report. Our report is enclosed; it contains our advice and recommendations on the issues which were put before us.

I would like to emphasize the fact that in my judgment none of the options examined can be viewed as making nuclear warfare more acceptable.

The panel members were pleased to be able to assist you on these matters and are willing to continue to be involved if work on these issues continues.

Sincerely,

JEROME B. WIESNER,
Chairman, Ad Hoc Panel on Nuclear Effects.

Enclosure.

Office of Technology Assessment—Response of the Ad Hoc Panel on Nuclear Effects

I. BACKGROUND

The ad hoc panel on Nuclear Weapons Effects was formed so that the Technology Assessment Advisory Council could advise the OTA Board on how to respond to a request for an assessment made to OTA by the Senate Committee on Foreign Relations. The Committee had asked OTA to determine whether the Department of Defense had adequately analyzed the effects of possible limited exchanges of nuclear weapons which resulted in detonations of weapons on or over U.S. territory.

The panel consisted of the following members:

Jerome Wiesner (Chairman), President of MIT
Harold Brown, [1] President of California Institute of Technology
Sidney Drell, [1] Deputy Director of SLAC (former member of PSAC)
Richard Garwin, IBM (former member of PSAC and the Defense Science Board)
Spurgeon Keeny, MITRE Corp. (formerly Assistant Director of ACDA)
Gordon MacDonald, Dartmouth College (former member of Council on Environmental Quality)
Gerald Miller (Former Deputy Director of Joint Strategic Targeting and Planning Staff)
James Neel, Dept. of Human Genetics, U. of Michigan (formerly Acting Dir. of Field Studies Atomic Bomb Casualty Commission)
Archie Wood, Brookings Institution (formerly Dep. Asst. Secretary of Defense)

The panel's single meeting was held on February 1, 1975. The Technology Assessment Board's Vice Chairman, Senator Clifford Case of New Jersey, attended part of the session. Also in attendance were OTA Deputy Director, Daniel DeSimone, William Mills, Tom McGurn, Buford Macklin, and Henry Kelly all of the OTA staff.

II. SUMMARY OF CONCLUSIONS

The panel members examined the results of the analyses of nuclear attacks which were given the Senate Foreign Relations Committee by the Department of Defense, and the assumptions which went into these analyses, in some detail. They concluded that the casualties calculated were substantially too low for the attacks in question as a result of a lack of attention to intermediate and long-term effects. They also concluded that the studies did not adequately reflect the large uncertainties inherent in any attempt to determine the civilian damage which might result from a nuclear attack.

The panel could not determine from the DOD testimony any consistent set of hypothetical Soviet objectives in the strikes analyzed. The attacks studied were evidently not designed to maximize destruction of U.S. ICBM's and bombers even though all ICBM's and large numbers of bomber bases were attacked. It seems apparent, however,

[1] Did not attend the meeting but concur with the panel's report.

even from the data now available, that if the Soviets used weapons now deployed or under development in an attack designed to maximize damage to U.S. strategic offensive forces, they would inflict massive damage on U.S. society. On the other hand, if the Soviet objective was something other than a desire to maximize damage to military targets, this objective was never made clear. It is evident that a small number of nuclear weapons could be detonated over isolated areas in the U.S. without causing significant civilian damage. It is not clear, however, that the Soviet Union could benefit in any way from such an attack particularly since they would be running the risk of a massive U.S. response. The panel's assessment of the material presented does not, therefore, intend to imply that its members feel that the attacks analyzed are sensible or realistic.

The panel also noticed that the material examined did not contain any estimates of the intermediate or long-term effects of attacks smaller than a "comprehensive military attack" although this was requested in the original inquiries of the Foreign Relations Committee. The panel was informed that the Office of the Secretary of Defense had been contacted about this issue and had responded by saying that this analysis had not been done and would require several weeks or months to perform. To the extent that policy will be based on this analysis, the panel finds this to be a serious deficiency particularly since the secondary effects of limited attacks on relatively remote installations are likely to represent a more substantial fraction of the total effects of such an attack than would be the case in a large attack near population centers.

The panel did not feel that it had enough information about DOD techniques for determining long-term effects to comment on the adequacy of these techniques.

While the panel believes that it is important that a realistic assessment of civilian effects be available for analysis of proposed changes in our target strategy and our attitude toward counterforce, they wish to emphasize that such analysis is only one and perhaps not the most important element of a much larger set of considerations affecting policy in this area. Such issues include: the effect, if any, on U.S. weapons acquisition, particularly weapons for hard-target counterforce attacks; the extent to which the new strategies could be executed without escalating into general nuclear war; the effect on deterrence of nuclear war; the degree to which such policy increases or decreases our reliance on nuclear weapons; the extent to which it raises or lowers the threshold of nuclear first use; and the effect on the perception of our allies about the credibility of our commitment to them. The panel recommends, therefore, that the Foreign Relations Committee ask for the additional analysis of casualties outlined in the following section only if it intends to engage in a discussion of these other issues.

III. RECOMMENDATIONS

If the Foreign Relations Committee wishes to improve on the existing DOD analysis, it should ask the Department of Defense to revise its existing analysis along the lines suggested below. OTA should not undertake an independent study.

The panel felt that if the Senate Foreign Relations Committee believed that more representative numbers would be useful for making

policy, these numbers could be obtained most effectively by approaching the problem in two steps: first, they could ask for a quick reworking of the analysis briefed to the Committee in September using revised assumptions which can readily be integrated into current models; second, they could also ask that DOD develop improved analytical techniques along the lines indicated in the appendix.

A Quick-Response Request

It should be possible for the DOD to respond rapidly to a request which asked them to repeat the analysis presented to the Committee using more realistic assumptions for a few key parameters. The panel suggests that the Committee also ask OSD to analyze additional scenarios for attacks if OSD feels that the attacks analyzed thus far do not represent reasonable examples of "flexible response" strategy or if they feel that the addition of other target sets would give a more complete picture of the range of possible targets which might be attacked in such strategies.

The new work should include the following changes:

1. Assumption of at least one ground burst in any attack on ICBM silos and a more plausible pattern attack around U.S. bomber bases.
2. Use of higher yield weapons (consistent with current intelligence estimates) so as to maximize the damage done to a hardened ICBM silo if fratricide effects preclude the use of more than one or two weapons per target.
3. Use of both average and adverse weather conditions (from the point of view of maximum civil effects).
4. Estimation of the deaths, injuries and genetic effects resulting from whole body exposure to radiation as well as the exposure resulting from inhalation and ingestion of radioactive materials. To assist other analysts in assessing these effects, the integrated dosage to the survivors from all sources (prompt and delayed) should be presented with these results.
5. Application of Civil Defense assumptions which do not presuppose that the urban population is familiar with the shelter areas available or that these shelters are all stocked with adequate supplies of essential materials for sustaining inhabitants for 30 days.
6. Use of 5–10 psi as criteria for deaths due to overpressure.
7. Estimates of deaths, injuries and other effects in Canada.

In all cases, the damage done to U.S. military targets should be made available (e.g., how may ICBM's survived, how many bombers escaped, what fraction of our ships were at sea)?

The results should also be accompanied by estimates of uncertainty which reflect, to the extent possible, the uncertainties inherent in the input assumptions, weather conditions, and in the modeling techniques used.

Some of these questions may have to be deleted from a "quick response" request if DOD feels that a lengthy effort would be required to prepare a response.

The studies made in responses to these questions should not require any major new work. The panel wishes to point out, however, that there are many fundamental problems in this analysis which have not been resolved or even studied extensively. The panel has attempted to outline some of the issues in an appendix attached to the current report.

Appendix; A Detailed Critique of the DOD Estimates

While the panel feels that the "quick response" task will give the Committee a better feeling for the damage which can be realistically expected from "limited" nuclear attacks, they do not feel that DOD techniques for performing such estimates are fully adequate, DOD may not be able to assess many of the subtle effects which would have some impact on the damage resulting from nuclear detonations on or over U.S. territory. A number of important variables were either not adequately explained in the presentation to the Committee, not adequately understood, or not adequately treated in existing models. While it would be unreasonable to expect that DOD could integrate all of the effects discussed below in any response which could be produced in a few weeks or months, the panel nevertheless feels that a thorough analysis can only be performed after the issues discussed below are thoroughly understood and integrated into the calculations.

Material presented with the further analysis should include:

1. A clear statement of the objectives of the attack and an analysis of the consistency of other assumptions with these objectives.
2. The damage done to military targets attacked as well as civilian effects.
3. An expression of the sensitivity of results to plausible variations in assumptions.
4. Indications of ranges of uncertainty in damage estimates, whether these uncertainties result from modeling difficulties, problems with intelligence projections, input variables such as weather, soil conditions, biological effects, or other sources.
5. Secondary and long-term effects, presented in a sufficiently systematic form that the results of different attacks can be compared.

A. Tactics of the Attack

1. It was not clear whether the one-megaton weapons were chosen for use in the attack briefed to the Committee consistent with an effort to maximize target damage or to minimize collateral environmental contamination. (If the objective was to maximize the damage done to ICBM silos, and only two weapons could be targeted on the silo, it would seem logical to employ large weapons in which the yield-to-weight ratio had been made as great as possible. On the other hand, if the objective were to minimize collateral fatalities, the emphasis might be on smaller weapons which were optimally designed to minimize collateral damage). The weapons selected for the attacks analyzed should realistically represent current intelligence estimates about the kinds of devices which the Soviets are likely to deploy during the next decade.
2. Detailed analysis should be available on the following issues:
   (*a*) How would fratricide effects influence the tactics of the attack? For example, would these effects prevent more than one surface burst or more than one air burst per target?
   (*b*) How does the probability of destroying a silo differ if a surface burst is used instead of an air burst? Does the confidence which one has in being able to verify that the silo had been destroyed vary with different kill techniques? (Factors such as the reduction in accuracy and reliability inherent in an air burst and the different kill mechanisms involved, should be considered).

(*c*) What would be the effect of uncertainties in missile accuracy which could result from fuzing uncertainties in air bursts.

B. FALLOUT DISTRIBUTION

1. The techniques used to predict the distribution of dust by particle size and density as a function of altitude should be explained and an effort should be made to integrate the results of recent studies of dust phenomenon into the models used. The analysis should also indicate the effect of uncertainties in dust modeling, uncertainties about soil conditions (due to a lack of geological information, variables associated with local weather, etc.) and other such uncertainties on the projected damage.

2. The analysis should make a more extensive examination of the effect of weather on the fallout distribution which results from the selected attacks and these variations should be reflected in the overall uncertainties associated with the damage assessment. The damage resulting from a variety of possible weather patterns should be made available together with the probability that such patterns might occur.

3. Estimates should consider the impact of rain on the distribution of fallout and the projected damage. Possible rain distributions and the probability that these distributions would occur should be examined. In addition, the impact of large atmospheric detonations on the probability of rainfall in the immediate area should also be included in the analysis.

4. The effect on fallout of uncertainties in the height of burst which might result from imperfections in the fuzing system should receive attention.

C. CIVIL DEFENSE

1. A thorough study should include an assessment of what is likely to happen in the event that an attack is made with little notice in light of the current state of public knowledge about the location of shelters and about the precautions which should be taken in the event of an attack. Some indication of the probability of finding 30 days worth of supplies and maintaining essentials such as heat in typical shelters should be indicated.

2. An assessment of the effect of delays in reaching shelter space and premature exit from shelter areas (necessitated by external responsibilities such as burial of the dead, reconstruction, or local emergencies or by shortage of supplies in the shelters) should also be undertaken.

3. An assessment of the feasibility of evacuating the affected areas should be available.

D. LONG-TERM EFFECTS

1. Damage effects should be detailed in a comprehensive and systematic way. At a minimum, each case examined should include the following information:

a. Fatalities and injuries resulting from:

Direct and indirect blast effects;

Indirect effects resulting from fires, disruption of transportation, communications, medical facilities, etc.;

Acute radiation deaths from fallout;

Cancers, genetic defects, life shortening and other direct effects of radiation exposure resulting from: external exposure, inhalation of radioactive particles, ingestion of material from the food chain or the water supplies;

Infections and diseases aggravated by the loss of resistance resulting from exposure to radiation.

Analysis of exposure should include both people exposed initially and people who have been sent to the area to assist in recovery. There should also be a discussion of world-wide effects with particular attention paid to Canada because of that nation's proximity to many U.S. targets which may be of strategic interest.

b. The average integrated REM per survivor from all sources (prompt and fallout) should be indicated along with the geographic distribution of these dosages and a discussion of the disabilities resulting from each exposure level.

c. A detailed analysis should be made of the impact of the attacks on the local areas most heavily affected. The discussion should include a discussion of the feasibility of restoring the area to a viable economy, the land lost to agriculture, manufacturing assets lost, skilled manpower lost, and the impact on local ecologies (permanent altering of watersheds, pollution of streams and rivers with radioactivity, bursting of dams, etc.). The effect of these local losses and problems on the national economy and environment should also be indicated.

d. An attempt should be made to indicate the magnitude of the effort which would be required to clean up the contaminated area and restore it to its pre-attack condition. It should be possible to draw on the experience which we have had in attempting to restore the Bikini and Eniwetok atolls.

2. An attempt should be made to determine the amount of radioactive material which would be released by U.S. sites damaged by the effects of the enemy attack. Such material might be found in power or research reactors, nuclear material reprocessing facilities, waste disposal areas for radioactive materials, military installations where some nuclear weapons are not in hardened storage areas, weapons carried by aircraft which are on the bases attacked, and possibly on the ICBM's which may be destroyed in their silos. The added fallout from these sources should be included in the assessment of overall radiation exposure.

U.S. SENATE,
COMMITTEE ON FOREIGN RELATIONS,
Washington, D.C., March 17, 1975.

Hon. JAMES R. SCHLESINGER,
Secretary of Defense,
Washington, D.C.

DEAR MR. SECRETARY: Following your testimony last fall before the Committee on Foreign Relations on the effects upon the United States of limited nuclear warfare, former Chairman Fulbright asked the Office of Technology Assessment to review and analyze the Department of Defense estimates.

A panel of experts convened by the Office of Technology Assessment has just provided the Committee with a report incorporating advice and recommendations for further study.

The panel's report, which is attached, suggests that the Department of Defense be asked to redo the analysis using "more realistic" assumptions. At the same time, the panel suggests that the Department analyze additional scenarios for attacks if the Department believes that analysis so far does not represent responsible examples of "flexible response" strategy or if the addition of other target sets would give a more complete picture of the possible range of attacks. In addition, the panel suggests that the Department should develop improved techniques leading to a more comprehensive analysis at a later point.

On behalf of the Committee, I would like to request that you direct the additional quick analysis as suggested by the panel and provide the analysis to the Committee as soon as possible. In addition, I would appreciate your arranging to do the further research the panel believed necessary for a more comprehensive study.

Please let me know if you question any of the panel's recommendations. Having reviewed the panel's report, I am inclined to believe that the work the panel suggests the Department accomplish would be of considerable value to both the Department and the Committee.

Sincerely,

JOHN SPARKMAN, *Chairman.*

Enclosure.

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE,
Washington, D.C., April 15, 1975.

Hon. JOHN SPARKMAN,
Chairman, Committee on Foreign Relations,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: The Secretary of Defense has asked that I respond to your letter of March 17, 1975. We appreciate your personal interest in our flexible response strategy and welcome the opportunity for further dialogue with your committee on this important subject. As you know, the Secretary has told Senator Case and others that the Department of Defense will cooperate in any way that it can to fully inform the Congress on the content and the ramification, of our nuclear strategy.

We in the Department have given careful consideration to the Office of Technology Assessment (OTA) report on our analysis of the effects of limited nuclear war which you enclosed in your letter of March 17th. We agree with the OTA conclusion that "such analysis is only one and perhaps not the most important element of a much larger set of considerations affecting policy" regarding the flexible nuclear response strategy. We agree that the larger set of considerations involves such issues as weapons acquisition policy, escalation control if war occurs, and the effect of the strategy on deterrence and on the perception of our allies about our commitment to them.

Where we disagree with the OTA report is with the focus upon "fine-tuning" the collateral effects calculations. While we plan to continue to improve our methodology in this area, we feel that our conclusions about the wisdom of the flexible response strategy are valid even if our calculations of the collateral effects of limited nuclear strikes contain a significant range of uncertainty.

A second concern with the OTA report is with the extensive degree of inaccuracy in the report's assertions about what assumptions were used in developing the collateral effects calculations and about what

supporting data is or is not available. We understand that the OTA panel did not have access to the classified part of our calculations; if so, that would explain in large measure the panel's lack of understanding in this regard.

The Department of Defense would welcome an opportunity to discuss further the flexible response strategy with you, the members of your committee, or your staff. In particular, we would like to clear up the misunderstanding regarding the assumptions which were used in the calculations and to explain further the analysis which is already available. If, after such a discussion, it is mutually agreed that it would be desirable to provide additional analyses with respect to the flexible response strategy, we would be pleased to do so.

If you would have a member of your staff contact me (697–0448) or Mr. Terrence J. King (697–0361), I am sure that an appropriate forum for discussion can be arranged.

Sincerely,

E. C. ALDRIDGE, Jr.,
Deputy Assistant Secretary, Strategic Programs.

[STAFF NOTE: In response to the letter of April 15, 1975, the Subcommittee staff met with Mr. Aldridge and members of his staff to discuss further analysis to be performed by the Department of Defense.]

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE,
Washington, D.C., July 11, 1975.

Hon. JOHN SPARKMAN,
Chairman, Foreign Relations Committee,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: As a result of your letter of March 17, 1975, Secretary Schlesinger asked me to provide to the Senate Foreign Relations Committee additional collateral damage analysis to assist you and others to better understand the uncertainties associated with DOD estimates of casualties and damage expected to result from postulated Soviet nuclear attacks against selected U.S. military targets. Prior to initiating the requested analysis, I met with members of your staff to discuss the direction such analysis should take to be most responsive to your needs. Attached is a copy of a letter to Mr. Bill Ashworth that sets forth the proposed analysis, as agreed to during our meeting.

The attached analysis, in response to your request, shows uncertainties in weapon system parameters, meteorological conditions, and civil defense effectiveness as well as the uncertainty of Soviet perceptions of what constitutes restrained collateral damage.

In sum, we continue to believe that the "comprehensive attack" scenario (resulting in 6.7 million fatalities) used in the Secretary of Defense's September 11, 1974 testimony before the Subcommittee on Arms Control, International Law and Organization is the most representative scenario which balances military effectiveness, potential restraint on the part of the Soviets to minimize collateral damage, and the physical uncertainties that could exist at the time of such a postulated attack.

Sincerely,

E. C. ALDRIDGE, Jr.,
Deputy Assistant Secretary of Defense.

Attachments.

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Sensitivity of Collateral Damage Calculations to Limited Nuclear War Scenarios

BACKGROUND

In response to a request from Senator Sparkman, DOD has undertaken a sensitivity analysis of collateral damage to assist the Senate Foreign Relations Committee and others to better understand the uncertainties associated with DOD estimates of expected casualties (fatalities and non-fatal injuries) and damage resulting from postulated Soviet nuclear attacks on selected military targets in the U.S. The intent of this analysis was to provide to the committee, to the extent possible, an indication of the sensitivity of results to input assumptions and attack scenarios. The basic scenario investigated was the "comprehensive attack" (which resulted in 6.7 million expected fatalities) used in the Secretary of Defense's September 11, 1974 testimony on counterforce attacks. In addition, attacks against selected Military Airlift Command bases, selected Minuteman wings (Malmstrom AFB and Whiteman AFB) and the entire U.S. ICBM force were evaluated. The analysis included:

Pattern attacks around U.S. bomber bases;

2–RV attacks against ICBM silos;

Use of various weapon yields and fission fractions consistent with current intelligence estimates;

Use of both favorable and adverse weather conditions (from the point of view of civil effects);

Civil Defense assumptions which both maximize and minimize civil effects;

An assessment of the military effectiveness of the various attacks.

Additionally, an assessment was made of the impact a "comprehensive attack" against selected U.S. military targets might have on Canada.

DISCUSSION

When a nuclear weapon of known yield is detonated on the surface of the earth or at a relatively low altitude in the atmosphere, the ranges of the immediate effects are fairly well defined. For example, there will be an area surrounding ground zero within which the destruction due to blast and shock, initial nuclear radiation and thermal effects will be so great that survival of inhabitants in conventional structures is improbable. At considerably greater distances from ground zero, the immediate effects will be weaker or non-existent and the delayed effects, those effects associated with the radioactivity present in fallout, will predominate. It is the phenomenon of radioactive fallout that introduces the greatest uncertainty into assessments of the casualties that would be expected to result from nuclear attacks on the United States.

There are two main ways in which the earth's surface can become contaminated with radioactive material as a result of a nuclear explosion. One is by the induced activity following the capture of neutrons by various elements present in the soil, and the other is by fallout, that is, by the descent of radioactive particles from the column and cloud formed in the explosion. The amount of contamination and its distribution over the earth's surface are principally dependent upon the energy yield of the explosion, the relative contributions of fission and fusion to the total yield, the height of burst, the nature of the surface over (or on) which the detonation occurs, and, finally, the meteorological conditions at the time of the explosion and shortly thereafter. For a given fallout distribution, the number of fallout casualties that can be expected to occur is determined primarily by the protection afforded the local populace against residual nuclear radiation.

In the following analysis an attempt is made to indicate the relative sensitivity of expected casualties to:

Assumed population protection profile
Meteorological conditions (wind)
Fission yield
Height of burst

PROTECTION FACTOR

The Defense Civil Preparedness Agency (DCPA) has collected and categorized, in terms of protection factors (PFs), information that describes the potential protection existing structures could be expected to afford the local populace against residual nuclear radiation following an attack on the U.S. For example, a single story brick residence (no basement) would be assigned a protection factor of 5, i.e., the dose rate in the residence would be 20% of that measured outside, while a residential basement would be assigned a PF of 25 (dose rate would be 4% of that on the outside).

Figure 1 depicts, in graphic form, a comparison between two shelter postures. The DCPA shelter posture is based upon the latest results (early CY 1975) of an ongoing National Shelter Survey and assumes maximum utilization of existing shelter spaces based upon compatability of shelter and population distributions. From DCPA's viewpoint, it is a reasonable representation of the protection that could be afforded the U.S. populace today. The Secretary of Defense shelter posture (that used in the Secretary of Defense's testimony before the Subcommittee on Arms Control, International Law and Organization on September 11, 1974), on the other hand, attempts to hedge against the possibility that, in a crisis, the U.S. populace may not respond in an idealized manner. As may be seen in the summary table within Figure 1, the Secretary of Defense posture allocates a preponderance of the population to low PF shelters whereas the DCPA shelter posture allocates only 14% of the population to low PF shelters.

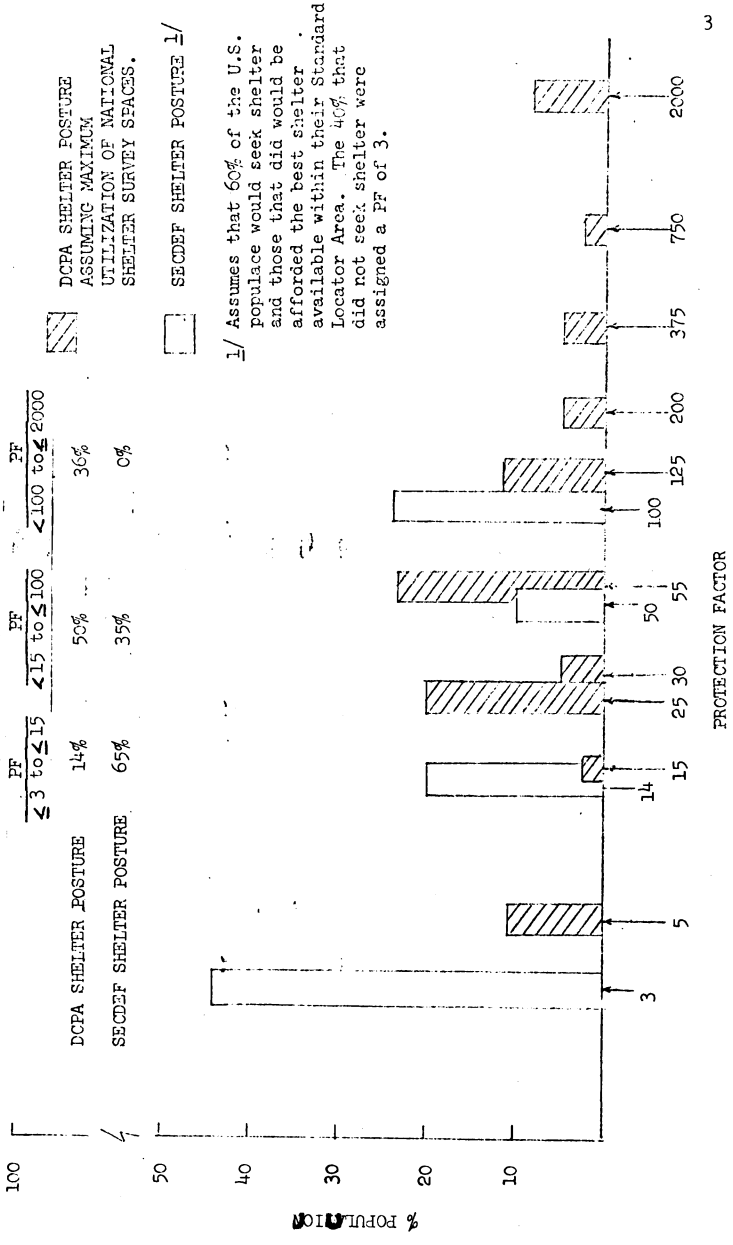


FIGURE 1

In the analysis that follows, the two protection factor distributions shown on Figure 1 will be used to assess the expected collateral fatalities resulting from various attack scenarios.

Figure 2 illustrates the sensitivity of expected U.S. fallout casualties to protection factor for an attack against the U.S. ICBM force. It may be seen from this chart that at low PFs, below 16, the expected casualty levels are highly sensitive to assumed PFs, while at PFs above 16 the expected casualty levels are relatively insensitive. While the results shown in Figure 2 are for a specific attack, they are representative of the relative sensitivity of expected casualties to assumed PFs across the entire spectrum of attack scenarios. In other words, changing the attack scenario would not change the conclusion that small changes in PF at the low end of the PF spectrum would result in a large casualty variability while large changes in PF at the high end of the spectrum would result in minor changes in expected casualty levels.

METEOROLOGICAL CONDITIONS

The meteorological conditions existing at the time of an attack and shortly thereafter (a few days) can have a significant effect upon the amount of destruction associated with the attack. For example, attenuation and absorption of thermal radiation is highly dependent upon the environmental conditions in the burst area, i.e., dust, fog, rain, snow, etc. Propagation of thermal energy, in turn, can have a significant impact upon the generation of both primary and secondary fires. Information concerning the growth and spread of fires from a large number of ignition points, such as might follow a nuclear explosion, and their coalescense into conflagrations is limited to the experiences of World War II incendiary raids and the two atomic bombs dropped on Nagasaki and Hiroshima. Due to the high degree of uncertainty as to the validity extrapolating from these limited experiences, no attempt has been made in DOD analyses to mathematically model fire storm generation.

The predominant meteorological condition that affects the number of expected casualties resulting from a nuclear attack is the distribution of localized pressure differentials or winds existing throughout the United States at the time of the attack and shortly thereafter.

Figure 3 depicts the expected number of casualties as a function of typical monthly winds for an attack against selected U.S. military targets. The attack consisted of surface detonating one 1–MT weapon on each of 1054 ICBM silos, 46 SAC bomber bases and 2 SSBN support bases (Charleston, S.C. and Bremerton, Washington). For illustrative purposes, a relatively low nation-wide protection factor of 5 was arbitrarily selected for use in calculating the casualty levels. It may be seen from this chart that, for the specified attack scenario, expected fatality and casualty levels could change by as much as a factor of 3 depending upon the winds selected. It should be noted that changing the attack scenario or any of the other multitudinous input assumptions could result in changes not only in overall casualty levels but also in the monthly casualty level distribution.

SENSITIVITY OF EXPECTED COLLATERAL

CASUALTIES TO PROTECTION FACTOR

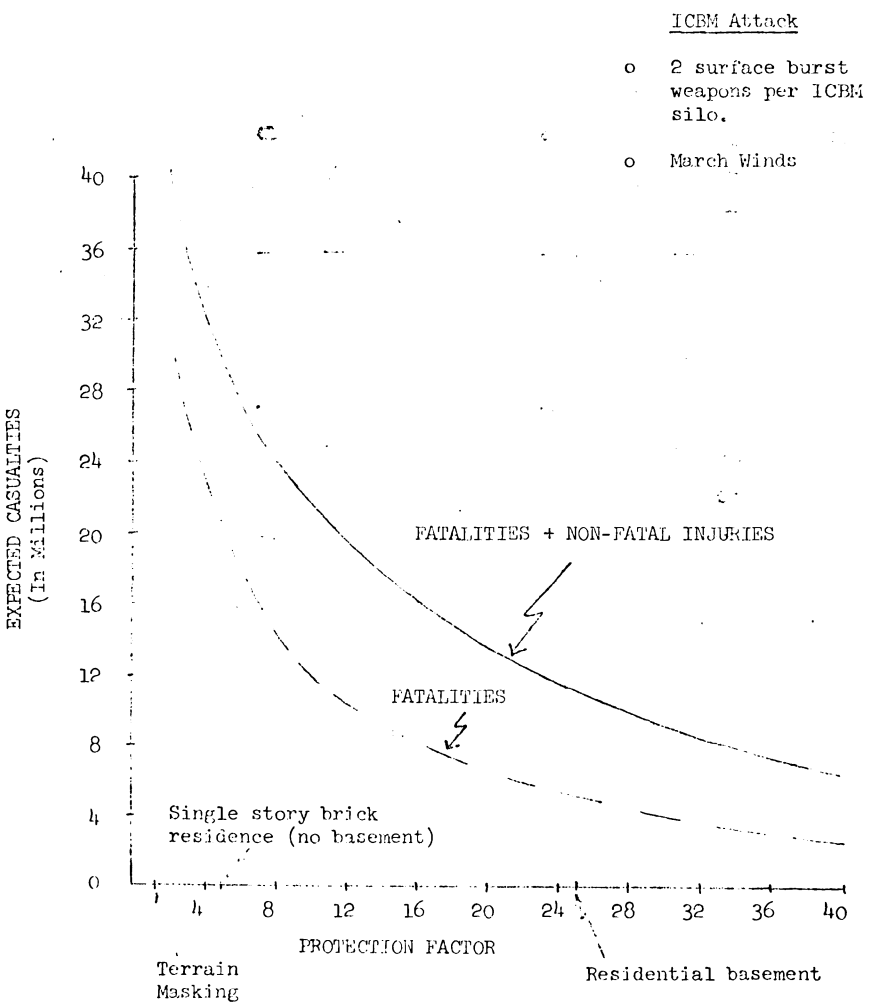


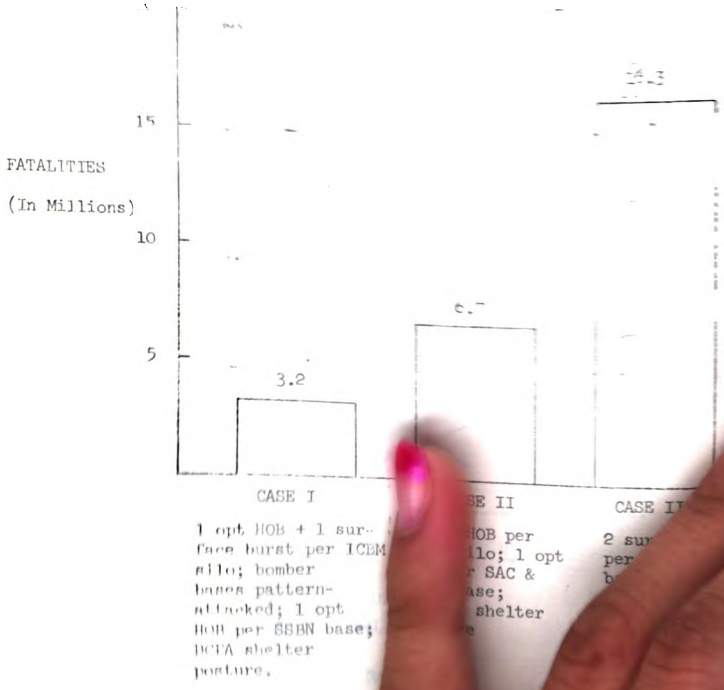
FIGURE 2

FIGURE 3

LIMITED NUCLEAR WAR SCENARIOS

Comprehensive Attack

Figure 4 illustrates for three cases the number of fatalities expected to occur following a comprehensive attack against selected military installations in the United States. In all three cases the target structure consisted of 1054 ICBM silos, 45 SAC bomber bases, and two SSBN support bases. Case II illustrates the results shown in the Secretary of Defense's September 1974 testimony while Case I and Case III represent excursions about Case II which might be viewed as reasonably bounding the problem. All three cases considered various weapon yields and fission contents consistent with current intelligence estimates of Soviet capabilities in the early 1980s and March meteorological winds. The primary differences among the three cases, which account for the variance in expected fatalities, lie in assumed protection profile, burst mode (surface or optimum height of burst) and number of arriving weapons.



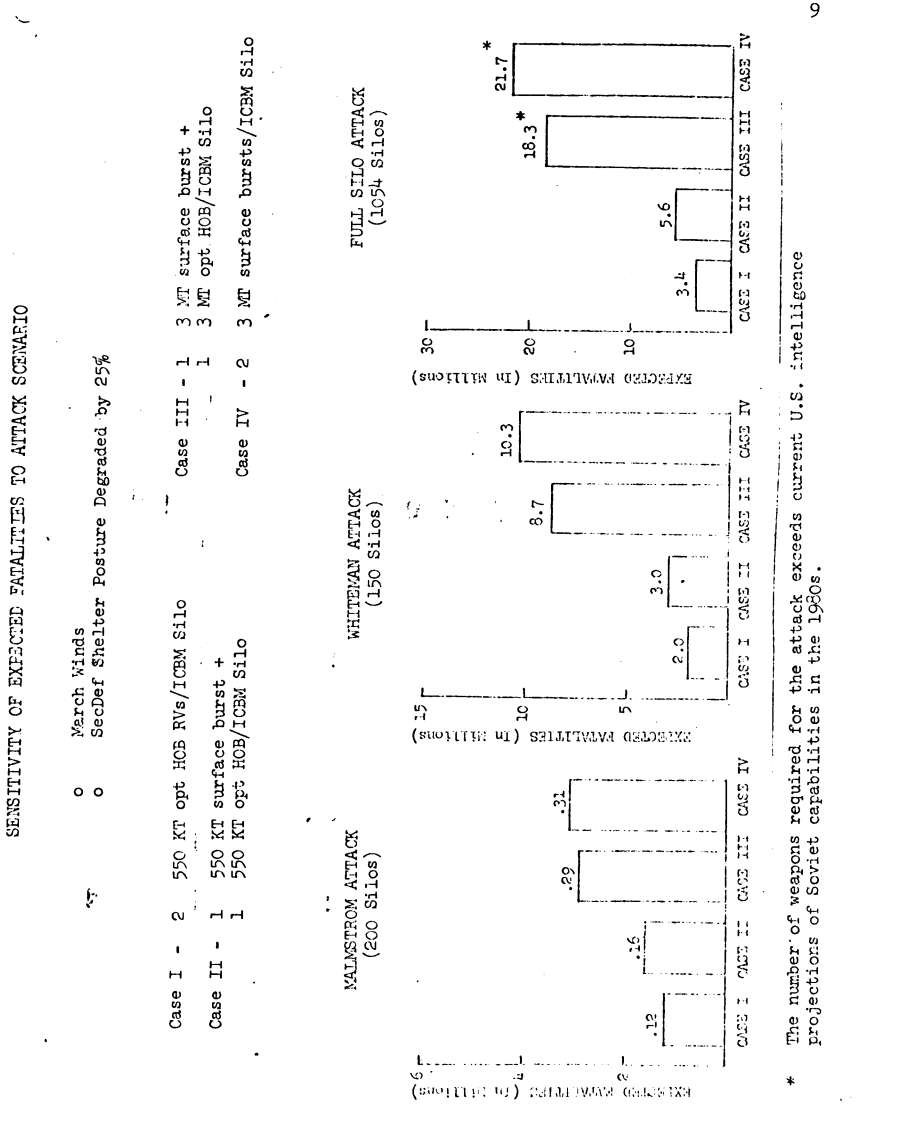


FIGURE 5

Case II assumed a population protection profile consistent with that labeled "SecDef Shelter Posture" on Figure 1 above and a weapon allocation consisting of two weapons per ICBM silo detonated at an altitude so as to maximize the lethal radius against a 2000 psi silo, and one weapon on each of the 46 SAC bases and 2 SSBN support bases detonated at an optimum height of burst. Cast III, on the other hand, assumed the SecDef shelter posture was degraded by 25% and all silos were attacked with two weapons detonated on the surface of the earth. Additionally, the 46 SAC bomber bases were pattern-attacked. Case I, like Case III, also assumed pattern attacks around the SAC bomber bases; however, each ICBM site was attacked with one optimum height of burst and one surface burst weapon. The

population protection profile used in Case I was the DCPA shelter shown on Figure 1.

ICBM Attacks

Figure 5 illustrates the variability in expected fatalities that can result from different attack scenarios. Whiteman AFB near Sedalia, Missouri and Malmstrom AFB near Great Falls, Montana were chosen for this analysis since attacks on these bases are representative of the maximum and minimum number of fatalities that could be expected to occur as a result of a Soviet attack on any one of the six Minuteman wings. The four attack scenarios, Cases I–IV, considered various weapon yields and fission fractions, height of burst combinations, and assumed a population protection profile equivalent to the SecDef profile shown on Figure 1 but degraded by 25%. Additionally, the results of a full silo attack (1054 ICBM sites) and shown for the same assumptions used in the Whiteman and Malmstrom attacks. Cases I and II assumed two 550 KT weapons were targeted against each silo while Cases III and IV assumed two 3 MT weapons were targeted against the same target structures. The burst mode was varied from two optimum height of burst weapons per silo for Case I to one optimum height of burst and one surface burst weapon per silo for Cases II and III to two surface burst weapons per silo for Case IV.

It may be seen from Figure 5 that, given the assumed population protection profile, the expected fatalities are very sensitive to the attack scenario and can vary by as much as a factor of 6–7 depending upon the parameters chosen.

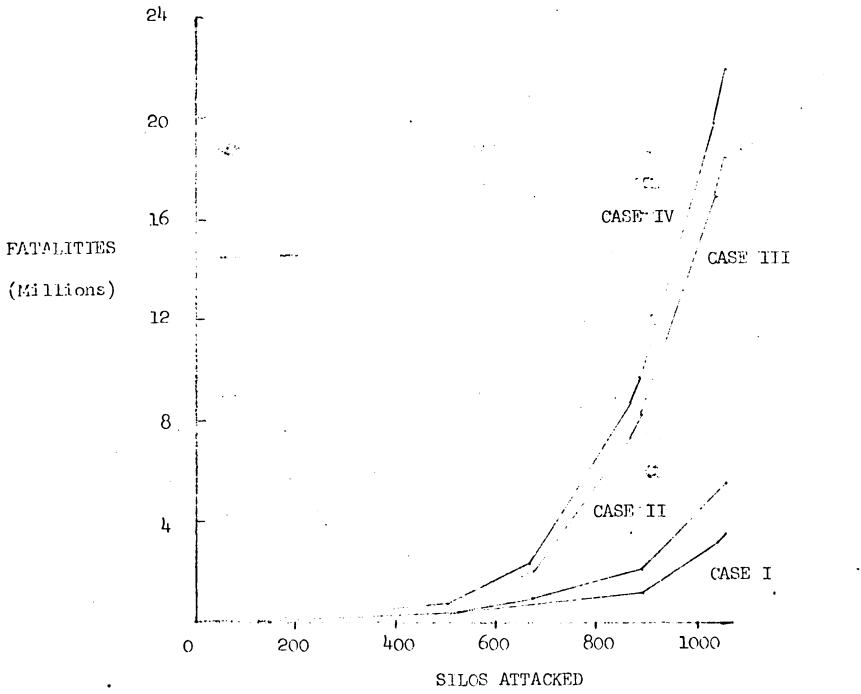
Figure 6 illustrates the incremental growth in expected fatalities for the four cases discussed above.

MAC Attacks

Figure 7 depicts the collateral damage that could result from two different attacks against the five major heavy airlift bases in the U.S.—Dover AFB, McGuire AFB, Travis AFB, Charleston AFB and McChord AFB. The attacks were postulated on the premise that during a conventional confrontation in Europe or the Middle East in which U.S. airlift capability was causing the tide to turn in favor of the U.S. allies, the Soviet Union might find destruction of our heavy airlift capability to be an attractive alternative. The attacks considered consisted of either a single 200 KT cruise missile or a single 1.2 MT SLBM targeted against each of the five bases and detonated at an altitude such that the damage to buildings and aircraft located on the bases would be maximized.

SENSITIVITY OF EXPECTED FATALITIES TO ATTACK SCENARIO

- o March Winds
- o SecDef Shelter Posture Degraded by 25%



Case I - 2 550 KT opt HOB per ICBM silo

Case II - 1 550 KT surface burst + 1 550 KT opt HOB per ICBM silo

Case III - 1 3 MT surface burst + 1 3 MT opt HOB per ICBM silo

Case IV - 2 3 MT surface bursts per ICBM silo

LIMITED NUCLEAR WAR SCENARIOS

Comprehensive Attack

Figure 4 illustrates for three cases the number of fatalities expected to occur following a comprehensive attack against selected military installations in the United States. In all three cases the target structure consisted of 1054 ICBM silos, 46 SAC bomber bases, and two SSBN support bases. Case II illustrates the results shown in the Secretary of Defense's September 1974 testimony while Case I and Case III represent excursions about Case II which might be viewed as reasonably bounding the problem. All three cases considered various weapon yields and fission contents consistent with current intelligence estimates of Soviet capabilities in the early 1980s and March meteorological winds. The primary differences among the three cases, which account for the variance in expected fatalities, lie in assumed protection profile, burst mode (surface or optimum height of burst) and number of arriving weapons.

SENSITIVITY OF EXPECTED FATALITIES TO ATTACK ASSUMPTIONS

(Comprehensive Attack)

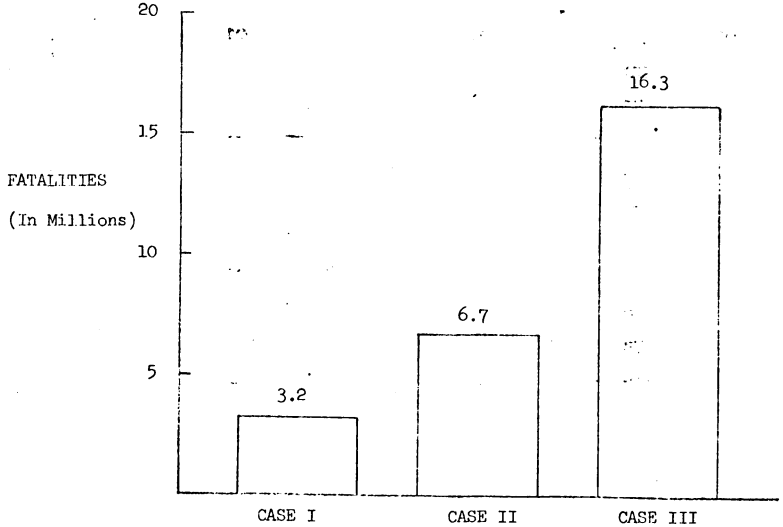
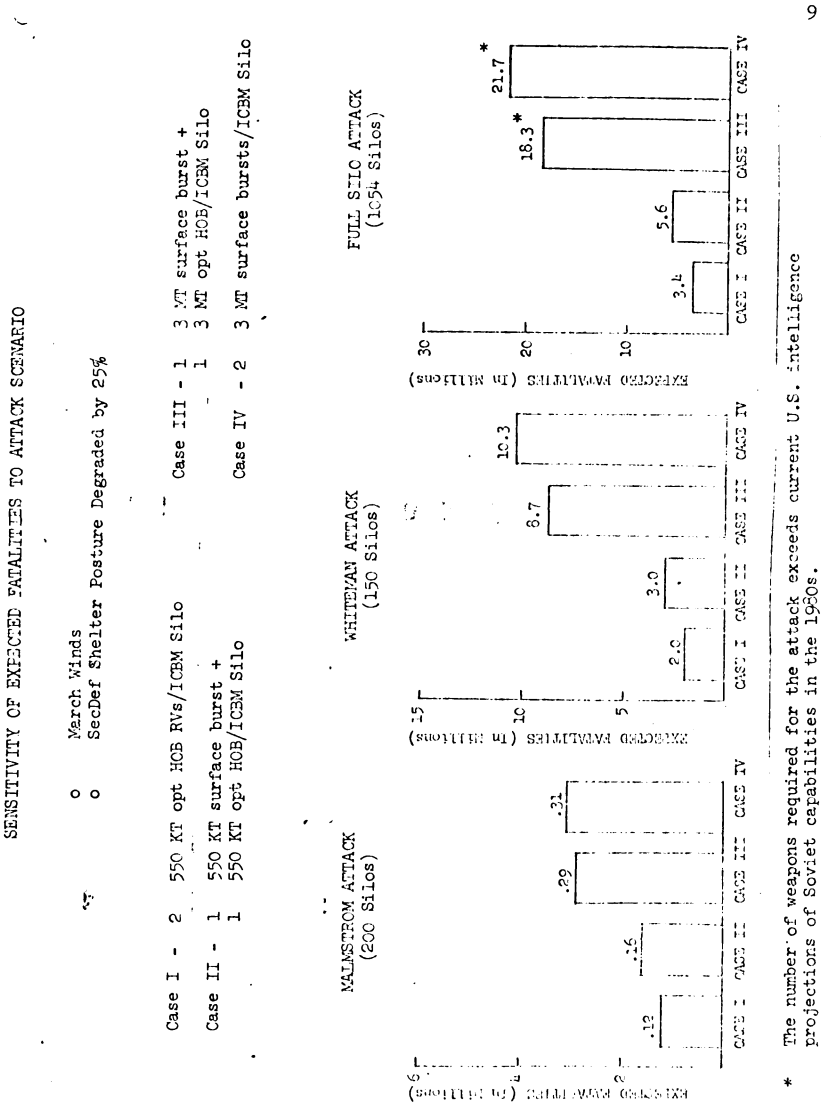


FIGURE 4



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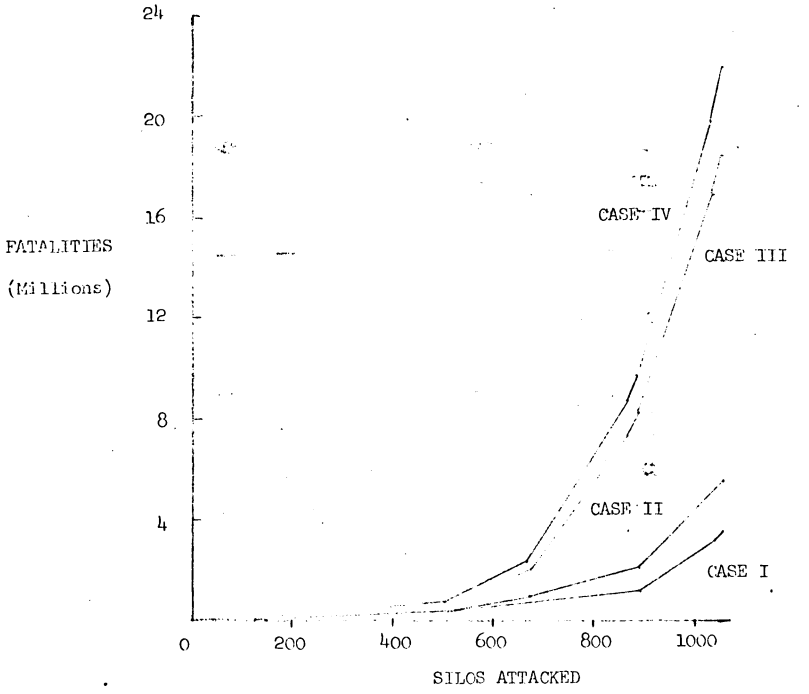
SENSITIVITY OF EXPECTED FATALITIES TO ATTACK SCENARIO

- o March Winds
- o SecDef Shelter Posture Degraded by 25%



Case I - 2 550 KT opt HOB per ICBM silo

Case II - 1 550 KT surface burst + 1 550 KT opt HOB per ICBM silo

Case III - 1 3 MT surface burst + 1 3 MT opt HOB per ICBM silo

Case IV - 2 3 MT surface bursts per ICBM silo

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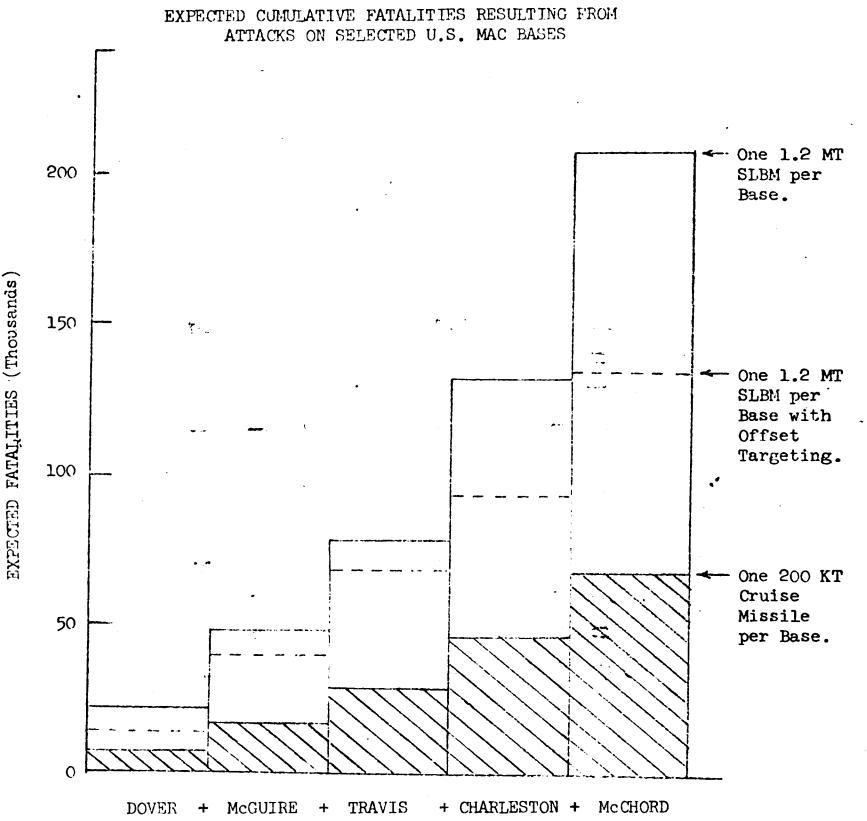

It is important to note that the fatality levels depicted in Figure 7 are for prompt effects only since the height of burst selected precluded the development of fallout. Further, as shown by the dashed lines on Figure 7, expected fatality levels could be significantly reduced with only minor reductions in military effectiveness should the Soviets choose to use offset targeting.

IMPACT OF COMPREHENSIVE ATTACK ON CANADA

The Case III "Comprehensive Attack" scenario shown on Figure 4 was chosen to evaluate the impact limited nuclear war scenarios might have on Canada since this attack is representative of a reasonable upper limit strike based upon the attack scenarios investigated.

Table 1 illustrates expected Canadian casualties that could result from this attack assuming the Canadian populace was afforded the same protection against residual nuclear radiation as the U.S. populace.

TABLE I.—EXPECTED CANADIAN CASUALTIES RESULTING FROM A COMPREHENSIVE ATTACK AGAINST SELECTED MILITARY INSTALLATIONS IN THE UNITED STATES

	Urban	Rural	Total
Prompt fatalities		1,400	1,400
Fallout fatalities	246,900	541,800	788,700
Total fatalities	246,900	543,200	790,100
Prompt casualties[1]	200	3,600	3,800
Fallout casualties[1]	359,600	844,700	1,204,300
Total casualties[1]	359,800	848,300	1,208,100

[1] Casualty figures include fatalities plus nonfatal injuries.

MILITARY EFFECTIVENESS OF POSTULATED ATTACKS

Table 2 summarizes, in general terms, the expected military effectiveness of the attacks discussed earlier.

TABLE 2.—MILITARY EFFECTIVENESS OF POSTULATED ATTACKS

Attack description	Evaluation of the attack	Expected fatalities
Comprehensive attack:		
Case I—1 opt + 1 surface burst per ICBM silo; bomber bases pattern attacked; DCPA shelter posture.	60 percent destruction; severe damage to virtually all A/C, hangers, administration buildings and maintenance facilities located on each SAC base; destruction of any A/C flying within 8 nm of any of the 46 targets SAC bases; 90 percent probability of capsizing or rupturing the pressure hull of SSBNs in port; severe damage to virtually all SSBN storage facilities, administration buildings, wharves and piers, and mechanical handling facilities located within 1.5 nm of ground zero.	3,200,000
Case II—2 opt HOB per ICBM silo; no pattern attack; SecDef shelter posture.	Same as above except: Destruction of any aircraft flying within 2 to 3 nm of any of the 46 targeted SAC bases.	6,700,000
Case III—2 surface burst per ICBM silo; bomber bases pattern attacked; SecDef shelter posture degraded by 25 percent.	Same as above except 57 percent silo destruction.	16,300,000
ICBM attacks:		
Case II—(1,054 silos; 1 550 KT opt HOB + 1 550 KT surface burst per silo).	42 percent silo destruction	5,600,000
Case III (1,054 silos; 1 3 MT opt HOB + 1 3 MT surface burst per silo).	80 percent silo destruction	18,300,000
MAC attack:		
200 KT cruise missile per MAC base	Total destruction of 40 percent of the A/C parked on aprons or in maintenance areas; severe damage to 30 percent of all administration buildings, air terminals and maintenance depots.	70,000
1.2 MT SLBM per MAC base	Total destruction of virtually all parked A/C, administration buildings, air terminals and maintenance depots.	210,000
1.2 MT SLBM per MAC base (offset targeting).	Total destruction of 95 percent of all parked A/C, administration buildings, air terminals and maintenance depots.	135,000

It should be pointed out that the above assessment presupposes exact knowledge of the myriad weapon and target parameters that go into determining the response a given target structure will have to a specified nuclear attack. While the parameters used are consistent with current intelligence estimates for both U.S. and Soviet systems, they inherently contain uncertainties. Thus, the military effectiveness results shown, while representative of what might be expected to occur, could be higher or lower should an actual attack take place.

SUMMARY

As perpetrator of a limited nuclear attack against selected military targets in the U.S., the USSR has significant control over the number of expected U.S. fatalities that could result from such an attack. For

example, Figure 5 shows that should the Soviets choose to undertake an effective military attack (2 3–MT surface burst RVs per ICBM silo resulting in ~80% damage expectancy) against one Minuteman wing they could reduce the number of expected fatalities from 10.3 million to 310 thousand by attacking the 200 Minuteman missiles at Malmstrom AFB vice attacking the 150 missiles at Whiteman AFB. Thus, the uncertainty of Soviet perceptions of restrained collateral damage as well as the uncertainties associated with weapon system parameters, meteorological conditions and civil defense effectiveness introduce a wide variability into assessments of expected U.S. fatalities that could result from limited nuclear attacks. While wide variabilities in expected fatalities exist, it is clear that the worst case limited attack scenario would result in far fewer fatalities and damage than would a massive strike on the U.S. urban industrial base.

We continue to believe that the "comprehensive attack" scenario used in the Secretary of Defense's September 11, 1974 testimony before the Subcommittee on Arms Control, International Law and Organization is a representative scenario that balances military effectiveness, potential restraint on the part of the Soviets to minimize collateral damage, and the physical uncertainties that could exist at the time of such a postulated attack.

U.S. SENATE,
Washington, D.C., March 19, 1975.

Mr. EMILIO DADDARIO,
Director, Office of Technology Assessment,
Washington, D.C.

DEAR MIM: I thought you'd like to know that the report of the Ad Hoc Nuclear Effects Panel has been well received by the Senate Foreign Relations Committee. For my part, as indicated at the last Board Meeting, I think the efforts of this panel have been extremely useful and constructive.

It occurs to me, and this view is shared by Senator Symington, chairman of the Senate Foreign Relations Arms Control subcommittee, that the panel's observations relative to need for exploring the broader implications of current U.S. defense policy are especially timely in view of the forthcoming Committee hearings on U.S. arms control efforts. It seems to us that the Committee could greatly benefit from a further spelling-out of the ad hoc panel's thinking on this subject. In this connection, I am glad to note that the panel's members offered to be of assistance to the Committee in further explaining their views.

Specifically, I would like to suggest that the members of this ad hoc panel be asked to identify and further explicate what they consider to be the major significant changes reflected in current U.S. strategic doctrine. These doctrinal changes, to be useful to the Committee in its forthcoming hearings, should be considered in terms of their implications for future SALT negotiations as well as for the Vladivostok accords.

Best wishes,
Sincerely,

CLIFFORD P. CASE,
U.S. Senator.

CONGRESS OF THE UNITED STATES,
OFFICE OF TECHNOLOGY ASSESSMENT,
Washington, D.C., May 6, 1975.

Hon. STUART SYMINGTON,
Chairman, Senate Foreign Relations Arms Control Subcommittee, 4229 Dirksen Senate Office Building, Washington, D.C.

DEAR MR. CHAIRMAN: The enclosed report was prepared by the Ad Hoc Panel on Nuclear Effects in response to a request received from Senator Case. Senator Case referred to your common interest in having the panel define more precisely its observations of February 25, 1975, relative to the need for exploring the broader implications of current U.S. defense policy. Specifically, the panel was asked to pursue further the subject of significant changes in current U.S. strategic doctrine, with special attention to their implications for current and future SALT negotiations.

The report has three major sections: the first section is a general survey of current U.S. policy for strategic weapons. This policy is compared with previous U.S. doctrine with unresolved issues and difficulties being noted in a brief commentary. The second section deals with the Vladivostok accord, including a brief summary of what the agreement does and does not do. The third section lists a series of crucial issues in strategic policy which relate directly to future prospects for strategic arms control.

Two of the most significant issues that emerge from examining the Defense Department Report for fiscal year 76 are that:

(1) political considerations are increasingly offered by the Defense Department as the rationale for the development and use of strategic nuclear weapons; and

(2) the Department of Defense attaches great importance to extending the capability of strategic nuclear weapons for possible use in a wide spectrum of conceivable confrontations with the Soviet Union.

These involve political judgments with far reaching significance for our security and surely call for consideration by all elements of the government responsible for foreign policy.

Time constraints and the geographic separation of panel members meant that the panel met in small committees rather than as a whole. However, all members of the panel participated in preparation of the report and agreed with its conclusions.

We hope that this report will be helpful to the Subcommittee on Arms Control, International Law and Organizations as it continues the hearings on the Vladivostok accords.

The panel remains available to you for further explanation of this report.

Sincerely,

J. P. RUINA

Enclosure.

MEMBERS OF THE AD HOC PANEL ON NUCLEAR EFFECTS

Jack Ruina (Chairman), Professor of Electrical Engineering, M.I.T. (former Director of the Advanced Research Projects Agency).

Sidney Drell, Deputy Director of the Stanford Linear Accelerator Center (former member of President's Scientific Advisory Committee).

Richard Garwin, Senior Scientist, IBM Corporation (former member of the Defense Science Board and the President's Scientific Advisory Committee).

Spurgeon Keeny, Director of Policy and Program Development, The MITRE Corporation (former Assistant Director of ACDA).

Gordon MacDonald, Professor of Environmental Studies, Dartmouth College (former member of Council on Environmental Quality and President's Scientific Advisory Committee).

Gerald Miller (former Deputy Director of the Joint Strategic Targeting and Planning Staff).

James Neel, Professor of Human Genetics, University of Michigan (former Acting Director of Field Studies, Atomic Bomb Casualty Commission).

Charles Townes, Professor of Physics, University of California at Berkeley.

Archie Wood, Assistant Project Manager, Energy, T.R.W. Systems, Inc. (former Deputy Assistant Secretary of Defense for Strategic Programs).

I. Commentary on the New Doctrine for Strategic Nuclear Weapons

For more than ten years strategic nuclear weapons policy has been dominated by a recognition that: 1) neither the U.S. nor the Soviet Union can protect its populations and industry from an attack by the other side even by using its entire inventory of weapons in a preemptive first strike; 2) once a nuclear weapon is detonated on the territory of either the U.S., or the U.S.S.R., there would be a substantial probability that the exchange could not be terminated before both nations were destroyed. However unpleasant this "balance of terror" may be, there has never been any real prospect of changing the situation in a fundamental way by purchasing new weapons or by adopting new tactics. It is essential that we not lose sight of this fact during complex arguments about the need to prepare for "limited" nuclear warfare.

U.S. objectives for its strategic forces are revealed in:

—Statements by the President, the Secretary of Defense, the Secretary of State and other high officials.

—Actual acquisition of new military systems and priorities in military research and development.

—Actual Plans for using existing strategic forces.

The objectives indicated in this way are not always consistent. In particular, our present forces cannot be explained entirely by a close reading of past statements by high officials on procurement objectives. The forces actually purchased often represent the effects of overreactions to Soviet initiatives, institutional momentum, inter-service rivalries, or the "manifest destiny" of an emerging technology. It would be unrealistic to expect a great deal of consistency from this history.

Secretary McNamara

Early in his term of office, Secretary of Defense McNamara stated that we should have a "flexible" strategic force which could be used in at least two ways: 1) to attack Soviet ICBMs and intercontinental bombers (avoiding civilian population as much as possible) with the objective of limiting damage to the U.S.; and 2) to attack the "entire

Soviet target system simultaneously." It soon became obvious, however, that limiting damage to the U.S. from a Soviet attack was a futile pursuit given the technical limitations of ABM, the difficulty of destroying Soviet strategic forces and the complex and costly problems presented by a program for effective civil defense. Acknowledging this state of affairs, McNamara later focused on one major objective:

> . . . our forces must be sufficiently large to possess an "Assured Destruction" capability. By this I mean an ability to inflict at all times and under all foreseeable conditions an unacceptable degree of damage upon any single aggressor, or combination of aggressors—even after absorbing a surprise attack . . . In the case of the Soviet Union, I would judge that a capability on our part to destroy, say, one-fifth to one-fourth of her population and one-half of her industrial capability would serve as an effective deterrent. (FY 69–73 Defense Program, pages 47 & 50.)

This was, of course, only a declared objective for procurement—it did not necessarily imply that the U.S. would only use its weapons to attack Soviet population although it clearly had the effect of threatening that we would use our weapons for this purpose.

Secretary Laird

Secretary Laird replaced McNamara's criteria with a list of four "objectives" for force planning:

> (1) Maintaining an adequate second strike capability to deter all-out surprise attack on our strategic forces.
>
> (2) Providing no incentive for the Soviet Union to strike the United States first in a crisis.
>
> (3) Preventing the Soviet Union from gaining the ability to cause considerably greater urban/industrial destruction than the United States could inflict on the Soviets in a nuclear war.
>
> (4) Defending against damage from small attacks or accidental launches.

This list did not represent a major change from the goals which had already been established. However, it made our interest in reducing Soviet incentives for a first strike an explicit element of planning. Later the ABM Treaty had the effect of eliminating objective 4 and making objective 1 much easier to attain since without a Soviet ABM, fewer and less sophisticated weapons are required for an "assured destruction" capability.

Secretary Schlesinger

Secretary Schlesinger's new doctrine consists of satisfying four major requirements:

> First, we must maintain an essential equivalence with the Soviet Union in the basic factors that determine force effectiveness. Because of uncertainty about the future and the shape that the strategic competition could take, we cannot allow major asymmetries to develop in throw-weight, accuracy, yield-to-weight ratios, reliability and other factors that contribute to the effectiveness of strategic weapons and to the perceptions of the non-superpower nations. At the same time, our own forces should promote nuclear stability

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both by reducing incentives for a first use of nuclear weapons and by deterring and avoiding increased nuclear deployments by other powers.

The second requirement is for a highly survivable force that can be withheld at all times and targeted against the economic base of an opponent so as to deter coercive or desperation attacks on the economic and population targets of the United States and its allies.

The third requirement is for a force that, in response to Soviet actions, could implement a variety of limited preplanned options and react rapidly to retargeting orders so as to deter any range of further attacks that a potential enemy might contemplate. This force should have some ability to destroy hard targets, even though we would prefer to see both sides avoid major counterforce capabilities. We do not propose, however, to concede to the Soviets a unilateral advantage in this realm. Accordingly, our programs will depend on how far the Soviets go in developing a counterforce capability of their own. It should also have the accuracy to attack—with low-yield weapons—soft point targets without causing large-scale collateral damage. And it should be supported by a program of fallout shelters and population relocation to offer protection to our population primarily in the event that military targets become the object of attack.

The fourth requirement is for a range and magnitude of capabilities such that everyone—friend, foe, and domestic audiences alike—will perceive that we are the equal of our strongest competitors. We should not take the chance that in this most hazardous of areas, misperceptions could lead to miscalculation, confrontation, and crisis." (I–13 and I–14)[1]

In the following sections we will attempt to be more specific about how the new doctrine differs from stated U.S. policy in previous years and to indicate how this new policy could affect our efforts to constrain nuclear competition through arms control. Primary attention will, therefore, be paid to those elements of this policy which may lead to requirements for new U.S. weapons or which could stimulate acquisition of new weapons by the Soviets.

A. ASSURED DESTRUCTION

1. *Current Policy.*—An assured destruction force remains an objective of the current DoD doctrine although it is no longer first in the new list of "requirements."

> This is not to say that a highly survivable force which can be withheld for substantial periods of time, if need be, and targeted against an enemy's major economic and political assets is irrelevant. Most of us can agree on the need for such a force to serve, at a minimum, as a deterrent to attacks on the cities of the United States and its allies.

[1] Unless otherwise noted, all page citations refer to the Annual Defense Department Report for FY 1976 and FY 1977.

> But to treat such a reserve force as an all-purpose deterrent, as a sovereign remedy for the problems we face, would be the height of folly. (II–3)

Mr Kissinger also seems to feel that an "assured destruction" policy is flawed. Secretary Kissinger told the press in 1972 that

> . . . the simplistic notion of the early 1960s which measured deterrent by the amount of civilian carnage that could be inflicted by one side on the other were always wrong; hence, to consider the mass use of nuclear weapons in terms of the destruction of civilian populations, one faces a political impossibility, not to speak of a moral impossibility. But this has been a fact, now, for five or six years. (Moscow, May 27, 1972)

This statement refers only to policy for using nuclear weapons. Dr. Kissinger does not suggest new criteria for purchasing nuclear weapons.

Despite the reduced emphasis on assured destruction in recent Administration statements, the major programs requested in the current budget (e.g., B–1 and Trident) are justified on the basis of the need to maintain a capability for "assured destruction."

2. *Background.*—The capability for "assured destruction" has been a primary and consistent element of U.S. strategic policy and has been used to justify the development of a "triad" of strategic arms that would be able to survive a Soviet attack and still retain a potential for attacking the Soviet population and economic base: missiles deployed on highly survivable Polaris submarines, ICBMs deployed in blast resistant underground "silos" (both equipped with MIRVs and penetration aids capable of defeating possible enemy defenses), and a sophisticated bomber force capable of taking off before an enemy attack could reach it and of penetrating Soviet air defenses.

Assured destruction was the primary procurement requirement from the mid-1960s through the tenure of Secretary Laird.

3. *Interpretation.*—(a) Previous statements about "assured destruction" mentioned attacks on both "urban" and "industrial" targets. The current formulation of "assured destruction" deals almost exclusively with plans for attacking the Soviet economic base, suggesting that weapons can and should be developed which can heavily damage industry and yet not kill many Soviets. If we can develop weapons with accuracies far greater than any currently available, we could (at least in paper calculations) attack some fraction of Soviet industry with low yield weapons and keep Soviet civilian casualties relatively low (by the standards of nuclear conflict). A large part of the Soviet industrial base, however, could not be attacked in this way. The extent to which this new formulation of "assured destruction" will translate into requirements for new weapons is not clear at this time.

(b) The new DoD report makes it clear that our assured destruction forces are not being jeopardized:

> Neither side, for the foreseeable future, is likely to acquire a disarming first strike capability against the other, even if the fixed, hard ICBM forces become more vulnerable in the 1980s." (II–3)

On the other hand, it expresses concern about the continued *credibility* of our deterrent capability:

> With a continuation of these "initiatives," and with the other programs outlined herein, I am confident that we can maintain a balance with the Soviet Union and assure a highly credible second-strike strategic deterrent within the framework of existing and future SALT agreements. *Without these programs, however, I can give no such assurance.* [Emphasis supplied.] (I–17)

B. CRISIS STABILITY

1. *Current Policy.*—The current DoD Report, like previous statements, notes U.S. interest in insuring that in a crisis neither side will be tempted to initiate a nuclear war because of fear that waiting for the other side to strike would put it in a less desirable position:

> . . . our own forces should promote nuclear stability both by reducing incentives for a first use of nuclear weapons and by deterring and avoiding increased nuclear deployments by other powers." (I–13)
>
> . . . neither that (counterforce) capability nor the improvements we are proposing for it should raise the specter in the minds of the Soviets that their ICBM force is in jeopardy . . . this improved hard-target-kill capability will not threaten the growing Soviet SLBM force . . . It follows that we do not have and cannot acquire a disarming first-strike capability against the Soviet Union. In fact, it is our decided preference that neither side attempt to acquire such a capability." (I–15 and I–16)

Since the current DoD Report argues that neither side could disarm the other, concern about "counterforce" capabilities must be put in perspective. The concern is apparently due more to the possible political and psychological costs of permitting one side to develop weapons theoretically capable of eliminating a fraction of the other's strategic forces than it is due to a fear that the core of either side's deterrent forces would be eliminated.

To the extent that these political and psychological concerns are taken seriously by either side, however, efforts might be made to overcome them (through new weapons programs or doctrine) which would have the effect of destabilizing an otherwise stable military situation. For example, if either side believed that its ICBMs might not survive a first strike, in a crisis, pressures could develop to use these weapons first rather than to lose them. In addition, plans could be developed for launching ICBMs on warning of an attack.

If either side believed that a major part of its strategic forces were vulnerable to a preemptive attack, great pressures would develop to replace these systems with more survivable forces—such as mobile ICBMs.

The current DoD Report suggests that matching Soviet "counterforce" capabilities for political purposes and for added "flexibility" is important enough to justify the risk of the Soviets interpreting these efforts as the first steps towards the development of a U.S. force capable of destroying the Soviet ICBM force.

The current DoD Report implies that we will attempt to challenge the Soviet deterrent forces if the provocation is sufficient:

> . . . our planning objectives should be to . . . leave unchallenged the Soviet capability for deterrence provided that our interests are respected and the traditional norms of international behavior are accepted. (I–10)

It later suggests that we are at least keeping open the option of developing a force capable (in theory at least) of attacking their ICBM force:

> . . . I must stress that we are not *now* seeking to develop the capability to destroy the Soviet ICBM force. [Emphasis supplied.] (II–5)

The requested program appears indistinguishable from the early stages of a program for developing a capability to attack (on paper at least) a significant fraction of the Soviet ICBM force. The Soviets could not know the extent to which we might deploy improvements in our system to give us substantial counterforce capability against their fixed land based ICBMs; thus any force capable of "limited" counterforce could well have the same impact on Soviet attitudes, strategies and programs as a more ambitious project. The Soviets may be particularly sensitive about maintaining the survivability of their ICBMs since roughly 75% of their strategic weapons are deployed on their land based ICBM force in contrast to the U.S. which has only 25% of its strategic weapons on land based ICBMs.

C. ESSENTIAL EQUIVALENCE AND POLITICAL PERCEPTIONS

1. *Current Policy.*—The discussion of the issue of "essential equivalence" found in the current DoD Report is unique in four ways:

(*a*) it makes the achievement of "perceived" equality with the Soviet Union the first objective of our strategic forces. This is justified as follows:

> . . . equality is also important for symbolic purposes, in large part because the strategic offensive forces have come to be seen by many—however, regrettably—as important to the status and stature of a major power . . . the lack of equality can become a source of serious diplomatic and military miscalculation. Opponents may feel that they can exploit a favorable imbalance by means of political pressure . . . (II–7)

(*b*) the need for equality is defined in such a way that it seems independent of military requirements;

(*c*) it notes that the "perceptions" of "non-superpower" nations are also of central importance; and

(*d*) it is much more specific than previous statements about how to define "essential equivalence." It includes such detailed measures as "throw-weight, accuracy, yield-to-weight ratios, reliability, and other such factors that determine force effectiveness" (I–13). It also includes appearance of counterforce capability.

> No opponent should think that he could fire at some of our Minuteman or SAC bases without being subjected to, at the very least, a response in kind. (II–4)

The extent to which Secretary of State Kissinger endorses this policy is not clear. On the one hand, he told the Senate Foreign Relations Committee on September 9, 1974, that "failure to maintain equivalence could jeopardize not only our freedom but our very survival."

> . . . While a decisive advantage is hard to calculate, the *appearance* of inferiority—its actual significance—can have serious political consequences. With weapons that are unlikely to be used and for which there is no operational experience, the psychological impact can be crucial. Thus each side has a high incentive to achieve not only the reality but the appearance of reality. In a very real sense each side shapes the military establishment of the other.

On the other hand, he told a press conference on November 25 of that year that "We are not going to build weapons just to match every large thing the Soviets have. We are going to build weapons for our purposes, not for an exact competition." He explained elsewhere that:

> When nuclear arsenals reach levels involving thousands of launchers and over ten thousand warheads, and when the characteristics of the weapons of the two sides are so incommensurable, it becomes difficult to determine what combination of numbers of strategic weapons and performance capabilities would give one side a militarily and politically useful superiority." (Senate Foreign Relations Committee, September 19, 1974)
>
> Throughout history the essential task of national security was to accumulate military power. It would have seemed inconceivable even a generation ago that such power once gained could not be translated directly into foreign policy advantage. . . . When two nations are already capable of destroying each other, an upper limit exists beyond which additional weapons lose their political significance. The overwhelming destructiveness of nuclear weapons makes it difficult to relate their use to specific political objectives and may indeed generate new political problems. (Speech to American Legion, August 20, 1974)

2. *Previous Policy.* The requirement for equality with the Soviet Union in a variety of strategic weapon characteristics has been noted in the past but never with as much emphasis as it is given in the most recent Annual Report. This may have been because the U.S. enjoyed a clear superiority in most aspects of strategic offensive weaponry until very recently. In 1968, Secretary McNamara argued that once both sides had deployed enough weapons to achieve an assured destruction capability, the concept of superiority became meaningless. In that year, however, the U.S. had nearly twice as many strategic delivery vehicles as the Soviet Union.

3. *Interpretation.*—

(*a*) Considerable ambiguity remains about the extent to which we will be willing to tolerate "asymmetries" in force characteristics under the new doctrine. The current Annual Report states:

> . . . we have a good second-strike deterrent, but so does the Soviet Union. Although the two forces differ in a number

of important respects, no one doubts that they are in approximate balance. There are, in short, no immediate grounds for fears about bomber or missile gaps. (I–16)

We may need to maintain an offsetting advantage in some areas to compensate for Soviet advantages in others. For example, the United States should seek to stay ahead in accuracy to offset the large and apparently growing Soviet advantage in throw-weight. (II–8)

Fortunately, the question of perceptions may to a large extent have been resolved by the understanding at Vladivostok . . . we shall plan for deployment of approximately 2,400 strategic delivery vehicles and 1,320 MIRVed missiles. (II–8)

(*b*) The forces of the U.S. and the Soviet Union differ considerably and a precise matching of all aspects of Soviet forces would require substantial changes in the current U.S. force. On the other hand, if we are willing to accept imbalances in detail, it is difficult to show that either side will have a clear overall advantage either now or in the near future. For example, the size and number of the Soviet ICBMs is matched by the technological superiority of U.S. ICBMs as well as by the large number and greater capability of U.S. long range bombers. The Soviets are building a large SLBM force but the U.S. has a significant lead in submarine and SLBM technology.

(*c*) A distinction must be made between matching capabilities and matching details of hardware. The differences in the technology base, geography, relationship to non-superpowers, and strategic doctrine of the two countries place ultimate limits to how symmetrical the strategic forces of both sides can be.

(*d*) Perceptions about military capabilities depend on a variety of judgments including i) perception of the overall balance in military hardware; ii) perception of general technological prowess; and iii) perception of the intent and determination of the political leadership. Since most of these judgments are necessarily subjective, and since they can change rapidly, we can never be confident that we have achieved "perceived equivalence." It is also not clear that we can compensate for subjective political judgments by adjusting our deployments of strategic weapons. The strategic forces of the U.S. and U.S.S.R. are now roughly equal (although they differ significantly in detail and scenarios can always be constructed which show an advantage for one side or the other) and in technology, the U.S. with the accomplishments of its space program and its clear lead in aeronautics and electronics is surely preceived by the world at large to be ahead of the Soviets.

To some extent, perceptions are influenced by the importance which the U.S. gives to various indicators of strategic strength. We may therefore be able to change these perceptions by emphasizing different aspects of the strategic balance.

D. FLEXIBILITY FOR LIMITED NUCLEAR OPTIONS

1. *Current Policy.*—The current Defense Department Report establishes as a central objective of our strategic forces a requirement for "a force that, in response to Soviet actions, could implement a variety of limited preplanned options and react rapidly to retargeting orders

so as to deter any range of further attacks." (I–13) The term "limited" is never strictly defined but it appears to include all attacks short of attacks on cities. It is unclear whether this requirement necessarily leads to a need for substantial improvement of current U.S. counterforce capabilities. However, the current DoD Report notes at several points that "limited preplanned options" will require "some ability to destroy hard targets" (I–13) and funds for weapons designed to support this capability are requested in this year's DoD budget.

The requirement for these new options is justified primarily by the argument that by having a capability for a full spectrum of nuclear attacks, the U.S. will improve the effectiveness and credibility of its deterrent:

> . . . even if there is only a small probability that limited response options would deter an attack or bring a nuclear war to a rapid conclusion, without large-scale damage to cities, it is a probability which, for the sake of our citizens, we should not foreclose. (II–7)
>
> . . . (an opponent) must be persuaded that in the face of a sufficient provocation, we will actually execute the retaliatory attacks. (II–1)
>
> It is intended to make nuclear war of any kind less, not more, likely. (II–6)
>
> . . . all of the evidence available to us suggests that very limited and quickly terminated nuclear exchanges could result in fatalities and casualties much lower than from some of the traditional conflicts . . . (II–7)

2. *Background.*—Concern about developing strategic nuclear forces capable of strikes other than city attacks has been a consistent part of the debate about U.S. nuclear policy. This concern has, until recently, seldom been reflected in public statements about our plans for using or our objectives for purchasing nuclear weapons. For at least a decade, however, U.S. forces have been physically capable of executing a wide variety of limited attacks which avoided cities. The ABM Treaty assured flexibility in our forces since, as a result of that treaty, the large numbers of weapons which we had developed for penetrating postulated ABM systems were no longer required for "assured destruction." Former President Nixon renewed public interest in the subject by calling repeatedly for alternatives to "assured destruction" strategies early in his administration, but this was not publicly reflected in Defense Department planning until 1974.

In his first Annual Report, Secretary Schlesinger explained that a major effort would be made to develop "limited" nuclear options. He explained the difference between his new policy and previous plans as follows:

> It is true that in addition to retaliatory targeting against urban and industrial centers, our war plans have always included military targets . . . In the past, most of these options—whether the principal targets were cities, industrial facilities, or military installations—have involved relatively massive responses. Rather than massive options, we now want to provide the President with a wider set of much more selective targeting options. Through the possession of such a visible capability, we hope to reinforce deterrence . . . (Anual Report for FY 75, page 4–5)

3. *Interpretation.*—

(*a*) The discussion of the doctrine of "limited preplanned options" contained in the current Report implies several things not explicitly stated. First, it suggests that we must be able to match a wide range of Soviet capabilities (as we perceive them), implying that the only way to deter a limited attack is to threaten similar attack in return. Secondly, it suggests that one of the attacks which we must be able to match is a massive Soviet strike at our strategic offensive forces—ICBM silos and SAC bases. Finally, it implies that flexibility may extend to options for using strategic nuclear weapons first:

> No opponent should think that he could fire at some of our Minuteman or SAC bases without being subjected to, at the very least, a response in kind. No opponent should believe that he could attack other U.S. targets of military or economic value without finding similar or other appropriate targets in his own homeland under attack. *No opponent should believe that he could blackmail our allies without risking his very capability for blackmail.* (II–4 and II–5) [Emphasis added]

(*b*) The Report also suggests that one of the important elements of the strategy will be to develop a capability for targeting Soviet industry and military facilities without causing large numbers of civilian casualties:

> In some circumstances, we might wish to retaliate against non-collocated, small soft targets, or facilities near large population centers; high accuracy and a low-yield, air-burst weapon would be the most appropriate combination for those targets. (II–5)
>
> . . . all of the evidence available to us suggests that very limited and quickly terminated nuclear exchanges could result in fatalities and casualties much lower than from some of the traditional conflicts we have experienced. And even if a nuclear exchange were to expand to all strategic nuclear targets in the United States, we would probably suffer at least 100 million fewer fatalities than if our cities were attacked. (II–7)

The real benefits of "limited preplanned options" are not made clear in the current DoD Report. Given that we could not limit damage to ourselves by executing any attack, however large, we must expect that the value of threatening limited attacks will not be military but political or psychological. It is difficult to distinguish between the political and psychological value of different "limited attacks." The DoD Report gives us no way to judge whether the capability to attack industrial facilities near major cities would be more effective as a deterrent than a capability to attack an isolated military installation or even a capability for a demonstrative attack on an uninhabited region. Also, the potential benefits of any "limited attack" must be weighed against the clear risk that the Soviet response to such attacks could be very large. In this regard, it is interesting to note that the current DoD Report gives no indication that the Soviets are attempting to develop small weapons capable of limiting damage to the U.S. population in a counterforce attack.

(c) The current Report also seems to establish a requirement for an ability to strike back with complete flexibility even after absorbing a massive Soviet first strike which had destroyed a large fraction of our ICBM force and suggests that SLBMs and bombers are not adequate for flexible response:

> Since both we and the Soviet Union are investing so much of our capability for flexible and controlled responses in our ICBM forces, these forces could become tempting targets, assuming that one or both sides acquire much more substantial hard-target kill capabilities than they currently possess. If one side could remove the other's capability for flexible and controlled responses, he might find ways of exercising coercion and extracting concessions without triggering the final holocaust. (II–4)

(d) The impact of the new flexible response requirements on U.S. plans for buying new weapons is not clear at present. A year ago Secretary Schlesinger indicated that no new weapons need be developed for added flexibility:

> We have very carefully distinguished, Senator Case, and I hope that you will join in explaining this distinction, between the change in targeting doctrine and the set of strategic initiatives that we are proposing. The change in targeting doctrine can be implemented without the procurement of any additional weapons. Accuracy contributes somewhat to the effectiveness of the new targeting doctrine, but it is not essential for the implementation of that doctrine. We do not have to acquire a single additional weapon. We could have selective responses even if we had a smaller force structure than we presently have, and with no greater yields. (Senate Foreign Relations Committee, March, 1974)

However, since the FY 76 statement calls for hard target kill capability, it implies that new weapons with higher yields and better accuracy will have to be developed (e.g., a new ICBM such as the MX, a large throw weight SLBM such as Trident II, and accuracy improvements including terminal homing MaRV's).

4. *Capabilities of Current and Improved Forces for "Limited Employment Options".*—A brief examination of what can be done to current forces to provide flexibility can put the new requirement in perspective.

(a) Our current strategic forces have the physical capability to attack nearly every significant Soviet industrial and military target (except for Soviet ICBM and SLBM forces) with a high probability of success. By mid-1975 we will have 8,500 independently targetable weapons only a small fraction of which could destroy a quarter (or more) of the Soviet population. Our current weapons could also destroy specific targets such as Soviet airfields, dams, submarine support facilities, isolated industrial facilities, etc. Our ability to attack any of these facilities in a limited strike with current command and control systems depends on several factors. If the target is already in the Soviet inventory (which is very large given the enormous number of independently targetable weapons) and a specific weapon has been programmed for that target, the only thing that need be done is

to establish a procedure for releasing the weapon. If this procedure is preplanned, the time delay in execution can be very short, a matter of minutes. In the unlikely event that the target is not already programmed, new targeting instructions must be developed for our ICBMs. This would require a number of days. To the extent that limited options require single weapons or single targets, we may also be limited by the fact that a large fraction of our forces carry MIRVs. Command Data Buffer, planned for Minuteman III, can reduce emergency retargeting time for a single Minuteman III missile from 16–24 hours to 36 minutes. (II–26)

Improved command and control systems alone would, of course, not increase our chances of destroying ICBM silos but would decrease the time required to execute limited attacks (involving one or very few missiles) if our current systems are not already targeted on the desired facilities.

(*b*) A substantial improvement in missile accuracy with current or increased yields would significantly raise the calculated probability of destroying ICBM silos but it would (for reasons discussed elsewhere) not lead to an operational capability for destroying the entire Soviet ICBM force. An operational capability could not be achieved in view of the problems of coordinating a massive attack, uncertainties about operational reliabilities and accuracies (our missiles have never been tested in operational trajectories), uncertainties about interference between multiple weapons targeted on a single silo (fractricide), and uncertainty about whether the Soviets would launch their ICBMs on warning of an attack.

Given very precise accuracies, extremely small nuclear weapons could, in theory, be used to attack specific sites (such as individual industrial centers) with a great reduction in loss of civilian lives. However, none of the weapons requested in the current budget seem to be designed to reduce civilian casualties; no new weapon system is mentioned as having smaller yields than its predecessor.

E. CIVIL DEFENSE

1. *Current Policy.*—The current Annual Report has made Civil Defense a central element of strategic nuclear policy:

> . . . one would expect that the recent shift in emphasis towards a more flexible strategic response policy, which I discussed earlier in this section of the Defense Report, would be reflected in our Civil Defense Program. (II–54)
>
> . . . our vey modest civil defense program should continue; it makes clear to a prospective opponent contemplating a limited strike that, since we can protect our citizens against fallout, we have a credible choice between an all-out response and no response at all. (II–5)
>
> Accordingly, we propose to continue our efforts, within the limits of the resources available, to improve our ability to protect the population in place against fallout and to develop in an orderly way two major options for the relocation of the population in a crisis. The first option, which would be designed against the threat of a Soviet counterforce attack, would involve the relocation of the population from high risk areas near key military installations . . . The

> second option, which would be designed against an all-out Soviet nuclear attack, would involve the evacuation of the population from cities, as well as from near key military installations. (II–55)

This new Civil Defense strategy has not, however, led to a significant increase in funds requested for Civil Defense in this year's budget.

2. *Interpretation.*—A modest, but well planned civil defense program, involving some training and storage of medical supplies, could be beneficial in the event of a highly limited nuclear attack (as well as during peacetime emergencies) and would not require prohibitive investments or raise the political and social complications associated with a major program. However, we have no way of knowing where a Soviet limited attack would occur, and it should be remembered that even a single megaton size weapon could cover regions hundreds of miles from its target (depending on height of detonation and meteorological conditions) with substantial levels of fallout. A much greater area would become radioactive at a level which could result in serious long-term health effects for the affected population.

As a consequence, a Civil Defense system that has any reasonable chance of protecting civilians against a large nuclear attack would require a very large investment in new equipment (e.g., large numbers of shelters with sophisticated access and entrances). If relocation is to become a part of our *flexible* nuclear response, drills and exercises would be required involving nearly the entire U.S. population. Implementing such a program could lead to an increase in international and domestic tensions.

F. INTERACTION WITH SOVIET PROGRAMS

1. *Current Policy.*—The new doctrine makes an explicit connection between U.S. plans for new programs and our perception of Soviet behavior. We apparently hope to persuade the Soviets to exercise restraint by implying that if they do not, we will invest heavily in new programs of our own. The FY 76 Report states:

> Assuming that the Soviet leaders exhibit restraint in their application of the (Vladivostok) agreement's principles, we are prepared to exercise restraint as well. However until we obtain solid evidence of Soviet restraint, we shall plan (to build up to the Vladivostok levels) . . . How we proceed on these accounts will depend essentially on the actions of the Soviet Union. They currently have the initiative, and it is up to them to decide how much additional effort the two sides should put into these programs. (II–8)
>
> The Soviets have already begun what will be a very substantial, indeed unprecedented, deployment of large new ICBMs in the first quarter of this year. However, if the principles and spirit of Vladivostok prevail, our response can be quite restrained. (I–14)

The kind of Soviet restraint which we will require if we are to have a "restrained" response of our own to their new ICBM programs is not made clear. It does not appear to mean that we require them to stop MIRV deployment short of the 1320 MIRVs on new systems as permitted by Vladivostok.

2. *Interpretation.*—This policy goes beyond attempting to enforce restraint in Soviet foreign policy by achieving "perceived equality." It attempts to constrain further advances in Soviet forces by promising to match any of their advances.

Given the ambiguity about who has the initiative in many programs, there is danger that this policy could lead to increased competition instead of mutual restraint. For example, the Soviets may not feel that they have the initiative; in fact, they may believe that they must react to new U.S. programs (such as M–X, U.S. improved accuracy programs, Trident, and B–1) with systems of their own designed to enforce U.S. restraint. A choice must be made as to whether the small military and political risks involved in exercising restraint outweighs possible benefits in restricting the arms race.

II. The Vladivostok Agreement

The Vladivostok agreement has two basic elements:

A. It limits both sides to 2,400 "strategic delivery vehicles" (SDVs) for a period of ten years. This total will consist of all ICBMs, submarine-launched missiles (SLBMs) and "intercontinental bombers." Other systems which the Soviets had previously wanted us to count in the U.S. totals, such as U.S. aircraft in overseas bases and the British and French missile launching submarines, are not counted.

The number 2,400 is approximately 50 less than the number of "strategic delivery vehicles" which the current DoD Report (page II–19) expects the Soviets to have operational by mid 1975. The agreement will thus require some reduction in Soviet forces. The U.S. will have 2,208 "strategic delivery vehicles" by mid 1975 and the ceiling would thus permit us to construct 192 additional SDVs before 1985. We could do this by constructing B–1s or Trident submarines without retiring older systems or constructing both and retiring some older systems (such as older Polaris boats, Titans, and B–52s).

B. The Vladivostok accords also permit each side 1,320 missiles equipped with multiple independently targetable reentry vehicles (MIRVs).

The U.S. currently has 1,046 MIRVed missiles operational or planned for conversion. If the Trident submarine is constructed along present plans, we will have 1,286 MIRVs by the time the agreement expires in 1985 (550 MMIII, 31 subs with 496 Poseidon or Trident I missiles and 10 Trident subs with 240 Trident missiles).

The 1,320 limit is substantially below the number of MIRVs which the Soviets could deploy by 1985 in the absence of an agreement.

The significant arms control benefits from Vladivostok are:

—It has established simple measures of equality in strategic forces.

—It extends the interim strategic offensive agreement thus protecting the ABM Treaty.

—It places an upperbound on worst case projections of the number of strategic delivery vehicles which the Soviets might deploy.

—It sets the framework for reductions and other arms control measures.

—It has overcome, for the time being at least, a serious obstacle in negotiations—the Soviets have for the first time agreed to exclude U.S. forward based systems and French and British SLBMs from the count.

Skepticism about the value of the Vladivostok agreement stems arguments that:

—The numerical limits are set very high so that planned U.S. procurements are not affected and even Soviet procurements may remain as planned.

—MIRV limits are too high to decrease whatever threat MIRV deployment may appear to pose for the strategic balance.

—There are no restraints for qualitative improvements so that the arms competition can continue unabated in spite of Vladivostok.

—The agreement does not redress the current asymmetry in ICBM throw-weight unless the U.S. plans to build new ICBMs to match Soviet levels.

—The high limits may provide both sides a license and justification to build eventually to higher limits than they might otherwise have.

There are several important issues that must be resolved before the Vladivostok agreement can be converted to a treaty.

—What methods, acceptable on political and technical grounds, can be used to verify the number of deployed MIRVed missiles?

—Will long-range, air-launched cruise missiles (ALCMs) be covered by the agreement? (Secretary Kissinger has told the press that the aggregate of SDVs would include "air-launched missiles" with ranges greater than 600 km (373 miles) but he did not specify whether cruise missiles were included.)

—Will long-range, submarine-launched cruise missiles (SLCMs) be covered by the agreement?

—Will the Soviet Backfire (currently in production) and the U.S. FB–111 (of which we have about 75) be included in the aggregate of SDVs?

—Can we adequately verify the number of deployed mobile ICBMs which are apparently permitted under the agreement?

III. Some Arms Control Issues Raised by the New Policy for Nuclear Weapons

A. How does the desire for "perceived" equality in all characteristics of strategic nuclear forces (including those areas where there are currently major asymmetries) affect the prospects for competition in strategic arms under Vladivostok? How does this requirement affect prospects for subsequent reductions and qualitative constraints?

Comments

1. Several fundamental U.S. and Soviet asymmetries cannot be eliminated: very different geography, technology, and a different constellation of allies and potential opponents. Consequently, it will probably only be possible to achieve overall equality and not equality in the details of weapons systems.

2. In defining essential equivalence it is difficult to determine whose judgment is important and what affects these judgments. This confusion could lead to attempts by both sides to match what it fears the other side might deploy for both military and political reasons. This could easily result in an arms race particularly given the time delay between initial intelligence on a new opposing system and full deployment of that system.

3. Weapons purchased for "political" purposes might undermine the stability of the military balance. For example, if either side develops a silo killing capability to enhance the "perceived" capabilities of its force, it could cause the other side to fear the military capability which this force had for a preemptive attack.

B. Will the current emphasis on added flexibility make arms control more difficult by leading to requirements for new weapons?

Comments

1. Our current strategic forces can be given great flexibility simply by changing existing plans and procedures. New missile payloads and improved guidance would be needed to destroy ICBM silos (even in principle) with high probability. Development of a high-accuracy, low-yield weapon could permit us to attack a greater number of "soft" targets with relatively few civilian casualties.

2. Given the considerable capabilities of our current force, it is not clear the added "flexibility" which could be achieved by purchasing new weapons would improve our ability to demonstrate resolve, to exert political or psychological pressure, or to reduce the likelihood of a massive Soviet response. If we determine, for example, that possible small Soviet attacks on our ICBM forces could be adequately deterred by U.S. capabilities to attack Soviet air-defense installations or other military or economic targets, we would not require any forces beyond those currently available.

C. Could the flexible response doctrine indicated in the current Annual Report lead to greater U.S. reliance on nuclear weapons? Could this increase the probability of the introduction of nuclear weapons in a conflict or that once these weapons were used, the "firebreaks" between "tactical," "theatre," and "strategic" use of nuclear weapons would be lost?

Comments

1. Emphasizing our ability and willingness to employ limited nuclear strikes with our strategic forces may be of some political value in reassuring our allies of our nuclear commitment and of our willingness to use all available resources to defend them. Such assurances might also serve to deter extreme non-nuclear provocations.

2. On the other hand, there is a risk that the distinction between nuclear and non-nuclear conflict could be lost if we convince ourselves that there is no operational distinction between the two types of war and that nuclear weapons (particularly "strategic" nuclear weapons) can be introduced without seriously risking escalation to an all out nuclear exchange. It is important to note, however, that the current DoD Report emphasizes the importance of conventional forces for meeting the security needs of ourselves and of our allies.

3. Extreme non-nuclear provocations might be more credibly deterred by political actions and by improving our conventional forces rather than by extending the flexibility of our strategic nuclear force. Budgetary constraints, of course, limit our ability to expand our conventional forces.

D. Would the development of a credible capability to destroy some of an opponent's hard missile silos affect the nuclear balance?

Comments

1. Currently neither side has a credible capability to destroy a large fraction of the other's fixed, hard ICBM silos.

2. If we develop a force with a credible capability to destroy some part of the Soviet ICBM force for the purpose of increasing the flexibility of our strategic forces, this force may be perceived as an important first step towards the development of a force capable of destroying all opposing ICBMs. Such a program could therefore risk the same Soviet response as a major U.S. counterforce program.

3. Perceived vulnerability of fixed, land-based ICBMs would reduce stability in a crisis and could lead to acquisition of more survivable replacement systems (thus motivating new generations of weapons).

E. Should restraint in the development and deployment of new types of strategic weapon systems be dependent on Soviet initiatives?

Comments

1. While the current Annual Report suggests that the initiatives in strategic weapon development are in the hands of the Soviets, the Soviets might not view the situation in the same light. From their perspective, the U.S. is responsible for many initiatives in strategic nuclear weapons (i.e., MIRVs, advanced missile guidance, advanced submarine technology, etc.).

2. The present momentum of military technology may limit arms control possibilities unless some restraint is exercised. Deployment of long-range cruise missiles and mobiles could make verification difficult or impossible. It would be difficult to negotiate an agreement which both sides could accept as providing overall equality if new types of systems were being deployed at a rapid rate.

F. How would the development of mobile ICBMs or long-range cruise missiles (launched from submarines or aircraft) by either side affect the prospects for future arms control?

Comments

1. Mobiles could offer a technique for overcoming the possible vulnerability of our fixed ICBM force but they could be difficult to count with precision since they depend for survival on denying the other side information about their location.

2. Air-launched cruise missiles of long-range could contribute to the survivability of our bomber force by assisting bombers to penetrate air defenses or even by eliminating the need for the aircraft to fly over hostile territory. Long-range missiles could be fired well outside enemy borders.

3. Long-range cruise missiles launched from submarines do not appear to add any important capability to U.S. strategic forces which our SLBMs do not already have.

Either system probably could be used to convert launchers designed for conventional warfare (such as attack submarines and transport aircraft) into strategic launchers without any visible modifications. This could prevent us from being able to count the number of deployed "strategic delivery vehicles" with any acceptable precision. However, before any such systems were deployed, many full-range flight tests would probably have to be conducted. This would run a risk of detection.

G. Where is the competition in strategic weaponry likely to be the most intense in the next ten years? Can we identify any developments in the foreseeable future which would be likely to lead to an intensification of the competition or which could complicate or preclude follow-on negotiations?

Comments

1. Emphasis on improving the qualitative characteristics of strategic weaponry is likely to replace emphasis on the numbers of delivery vehicles even on the Soviet side during the next decade. This will be particularly true under a SALT agreement which places an upper limit on numbers of launchers.

2. Improved accuracy (using terminal guidance and other techniques), cruise missiles, and mobile ICBMs are likely candidates for future competition.

3. Banning a new technology becomes much more difficult once flight testing of that technology has been completed. Not only are limits more difficult to verify after system testing has been completed; a tested system often acquires a degree of institutional commitment which can be difficult to overcome.

4. Once innovations in strategic weaponry are deployed by one side, it is difficult to limit these systems without permitting the side which is behind to catch up. This is true not only for new types of strategic systems but also for new generations of existing weapons systems.

AUGUST 5, 1975.

Dr. JEROME B. WIESNER,
President, Massachusetts Institute of Technology,
Cambridge, Mass.

DEAR DR. WIESNER: The Subcommittee on Arms Control, International Organizations and Security Agreements has received further analysis from the Department of Defense on the collateral effects of nuclear attacks upon military installations in the United States.

The new analysis, which is attached, was requested by the Subcommittee upon the recommendation of the panel of experts, which you chaired, of the Office of Technology Assessment's Advisory Council. The work of your panel was instrumental in getting this new Defense Department analysis.

I believe that the information collected so far should be made available to the public. Accordingly, I would appreciate it if you and the other members of your panel would assess the new anaylsis of the Department of Defense and provide the Subcommittee with your comments in time for publication of the material in early September.

The Subcommittee also intends to hold further hearings on this subject. I hope that you and representatives of your panel will be able to appear then. The staff will let you know of specific plans later this month. George W. Ashworth, the staff assistant for the Arms Control Subcommittee, is coordinating this project for me. He is available at 202–224–5382.

Sincerely,

STUART SYMINGTON.

57-852 O - 75 - 4

SEPTEMBER 15, 1975.

Hon. STUART SYMINGTON,
Chairman, Subcommittee on Arms Control, International Organizations and Security Agreements, Senate Committee on Foreign Relations, Washington, D.C.

DEAR SENATOR SYMINGTON: Thank you for your letter of August 5. I was pleased to hear that the work of the OTA panel on nuclear effects was useful to you and to your subcommittee and that the subcommittee has invited several of the individuals who contributed to the report to appear before your subcommittee. They will be prepared to elaborate on the findings in the original report, interpret the new work which has been performed by the Department of Defense, and indicate areas where they feel more work and analysis must be performed.

As you will recall, last fall the Senate Committee on Foreign Relations asked the Office of Technology Assessment to review critically Defense Department estimates of the civilian casualties which might result from a nuclear attack on U.S. defense installations. This issue was raised in two hearings held by the Committee last year to examine the implications of the new doctrine for our strategic nuclear forces recently proposed by the Secretary of Defense. Estimates of civilian casualties are significant in this investigation because one of the advantages claimed for a "counterforce" doctrine is that it could result in a significant reduction of civilian casualties in the event of a nuclear war.

I was asked by the OTA to chair a panel of experts on the subject of nuclear effects to consider the Committee's request. The panel concluded (in a report dated February 25, 1975) that the civilian casualties calculated by the Department of Defense were "substantially too low for the attacks in question" both because some of the assumptions used in the calculations seemed unrealistic and because a number of significant effects (such as the effect of fires and the long term effects of radioactive contaminents) had not been adequately examined. The panel recognized that it would be difficult for the Department of Defense quickly to make all of the improvements suggested by the report and thus divided its suggestions into a part which panel members felt could be done rapidly and a part which would require more extensive research and analysis.

The February report also noted that "The panel could not determine from the DOD testimony any consistent set of hypothetical Soviet objectives in the strikes analyzed." In this connection the report pointed out that the technical issue of estimating casualties could not easily be separated from the context of a variety of other issues which must be addressed in considering the merits of any proposed revision in strategic doctrine.

The Committee, upon receiving the panel's report, transmitted it to the Department of Defense together with a request that additional calculations be performed. The panel was also asked for further elaboration of its comments concerning the need to consider the casualty estimates in the context of the broader strategic issues involved.

We have received a copy of the additional material prepared by the Department of Defense at the Committee's request. The new estimates of casualties were in most cases considerably higher than those shown

in the original work. For example, the calculation originally presented to the committee showed that about 800,000 people would die as a result of a Soviet attack that was limited to our ICBM forces. The new results show that fatalities from such an attack could be in the range of 3½ to 22 million. The previous calculations indicated that an attack on the Minuteman ICBMs deployed near Whiteman Air Force Base in Missouri would kill between 1,000 and 26,000 people living in St. Louis. The revised estimates show that 2–10 million people might die as a result of this attack.

The casualties shown in the new calculations are greater primarily because the new study changes several crucial assumptions: 1) some of the new cases assumed that weapons would be detonated on the surface of the earth instead of being detonated in the air (a surface explosion creates significantly more fallout); 2) the new calculations assumed that the hypothetical attack occurred in March (a month when the winds tend to spread fallout to great distances); 3) some of the new calculations make less optimistic assumptions about the probability of placing large numbers of people in adequate fallout shelters; and 4) the new calculations assumed that the Soviets used a more effective technique for attacking our bomber bases (using multiple weapons instead of just a single weapon on each air field).

It should be emphasized, however, that the Committee did not request, and the Department of Defense did not provide, estimates of casualties which could result from fires, long term radiation exposure, the interactive effects of the loss of communications, hospital facilities etc. These effects are extremely difficult to calculate with any accuracy but if they were included in the analysis, estimates of casualties could be significantly increased. (I understand that Dr. Garwin is preparing some estimates which will show the approximate areas in the U.S. which might be affected by fallout from the attacks being studied.)

Upon request, the panel followed up its recommendation in the March report that the issue of civilian casualties be viewed only as one of a large number of other issues necessarily raised by a revision in strategic doctrine. This elaboration of the previous work was sent to the Committee on May 11, 1975. It attempts to provide a perspective on the issues raised by the new strategy by explaining the new strategy as clearly as possible, by highlighting the ways in which the new doctrine differs from previous U.S. policy, and by clarifying some of the major issues posed by the proposed policy revision. I was unable to participate in this work because of pressing responsibilities here at MIT during the period when the panel was scheduled to do its work. The group was ably chaired by Professor Jack Ruina who was asked to serve as chairman during my absence.

The panel's analysis highlighted the fact that the new strategic doctrine places major emphasis on the political and psychological utility of nuclear weapons and uses both political and military justifications for the procurement of new weapons. The group also noted that the new strategy implies a significantly greater interest in having the U.S. use strategic nuclear weapons for a variety of levels of possible confrontations with the Soviet Union.

Any change in nuclear doctrine must, of course, be tested against a variety of standards. It must deal with the danger of untolled escalation of any nuclear conflict. We must understand whether it increases

the probability that nuclear weapons would be used in a crisis. We must decide how the policy affects prospects for arms control—particularly our efforts to limit the strategic arms race and our attempts to control the proliferation of nuclear weapons. The budgetary implications of the new strategy must also be understood.

I hope that the material provided by the panel can be of some assistance to the committee as it begins once more to examine these difficult issues.

Sincerely yours,

JEROME WIESNER.

SEPTEMBER 11, 1975.

Hon. STUART SYMINGTON,
Chairman, Subcommittee on Arms Control, International Organizations and Security Agreements, Senate Committee on Foreign Relations, Washington, D.C.

DEAR SENATOR SYMINGTON: In preparing to comment on the most recent Defense Department estimates of the civilian casualties likely to result from a Soviet attack on U.S. strategic forces, I herewith present some preliminary calculations which I hope can be of some use to you as you prepare to hold hearings on the subject. I hope to provide further analysis in my testimony during those hearings.

Sincerely yours,

RICHARD GARWIN.

Any analysis of the desirability of different strategic force and targeting options should involve a discussion of a variety of questions:

The extent to which the strategy tends to stabilize or destabilize a crisis situation (in general, a situation where one or both sides stand to lose a substantial fraction of their forces by waiting for the other side to strike first is an unstable one);

The extent to which the strategy is technically or tactically feasible (for example, a force designed to eliminate opposing ICBMs could be frustrated if the targeted missiles are launched before the attacking weapons arrive);

The extent to which civilian casualties can be limited in the war;

The extent to which the policy interferes with or advances arms control;

The extent to which the program requires new weapon systems.

A variety of others could be listed.

Most of these issues have not been adequately debated in evaluating the new strategic doctrine proposed by the Secretary of Defense. If the Department of Defense has made broad analyses of these matters, most of this material has not yet been presented as supporting material to this committee, nor has such material been presented to the Congress by the Secretary of State.

As a result of this Subcommittee's efforts, the issue of civilian casualties has probably been more thoroughly discussed than most of these questions. In his September 11 testimony before the Subcommittee on Arms Control, International Law and Organizations, the Secretary of Defense estimated that a "comprehensive attack" on U.S. strategic forces might result in 6.7 million fatalities. More recently, the July 11, 1975 letter from Deputy Assistant Secretary of Defense Aldridge to Senator Sparkman (with its enclosure) shows examples of fatalities resulting from such an attack in the range of 6.7–16.3 million fatalities. (This is an indication of the uncertainties in such estimates.)

The attached charts illustrate the kind of damage this represents by plotting the areas affected on maps of the U.S. The procedure employed to produce this material approximates that used by DOD to calculate civilian casualties. The results of all such calculations depend critically on the number and nature of the nuclear weapons employed, whether the weapons are ground burst or air burst, the degree of protection against nuclear radiation provided the population, the provisions made for evacuating population, and a variety of other factors. It should be noted that the fatalities calculated by DOD (and the areas of damage indicated on the attached charts) do not include any estimates of damage due to fires, the effects of thermal radiation from the nuclear explosions the disruption of medical facilities, transportation, and other critical segments of the population.

Many of these questions will be addressed in more detail by myself, Dr. James Neel, and Dr. Sidney Drell in the forthcoming hearings before your committee.

The following assumptions were used in preparing the charts:

Three weapons on each of the 46 airfields indicated on the map which accompanied Secretary Schlesinger's testimony to the Foreign Relations Committee on September 11, 1974 (reproduced on page 50.);

Two weapons per ICBM silo at bases shown on same map;

One weapon on each of the two SSBM support bases shown on the same map;

The weapons used on silos were assumed to be surface bursts, all others were assumed to be detonated at high altitude;

All weapons were assumed to be one megaton with 50 percent fission yields;

March winds were used.

Since we cannot be certain that we have used precisely the same distribution of winds as the Department of Defense, and since we have used a very simple approximation for estimating radiation doses, it is unlikely that the patterns shown are a precise depiction of the areas affected in the DoD study. The charts should, however, give a rough feeling for the magnitude of the areas which will be damaged. Several other qualifications should be recognized before interpreting the results:

The areas shown on the map are the result of a number of approximations. As a result, the boundaries indicated show only generally which regions are affected. They should not be interpreted as precise dividing lines.

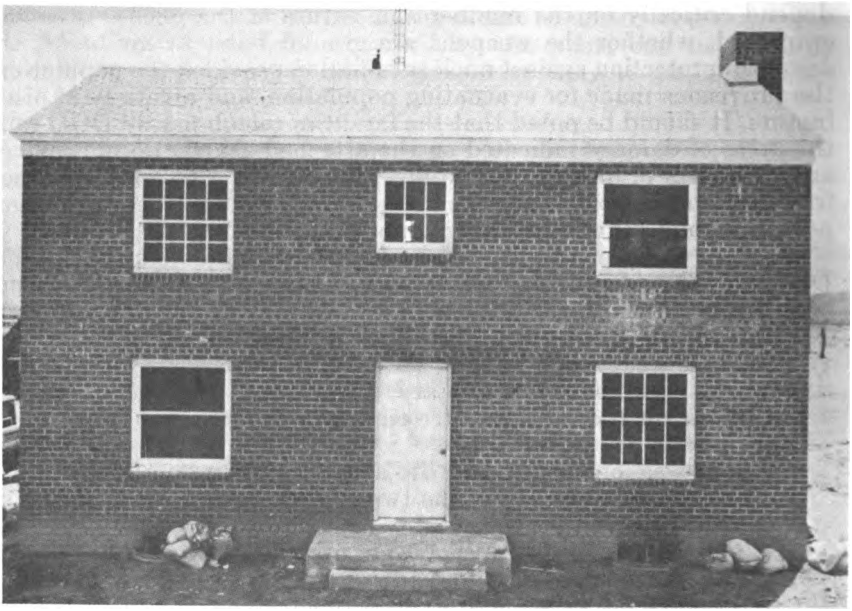
All of the fallout shown results from the attack on ICBM silos since weapons used against other targets were assumed to be exploded sufficiently high to insure that the radioactive materials released by the explosions would not be deposited as "local fallout" and would instead be deposited over a large area in the northern hemisphere (assuming that there was no rainfall affecting this distribution).

Only 138 weapons were used on the bomber bases (the SALT I agreement permits the U.S.S.R. to have 950 SLBMs, some of which might have several weapons under the limit of 1320 MIRVs permitted under the Valdivostok Agreement.) If the Soviets used more weapons on each base, the radius of damage around the base would increase beyond that shown on the charts.

The areas affected by the attack are very sensitive to the speed, structure, and direction of the winds blowing at the time of the attack.

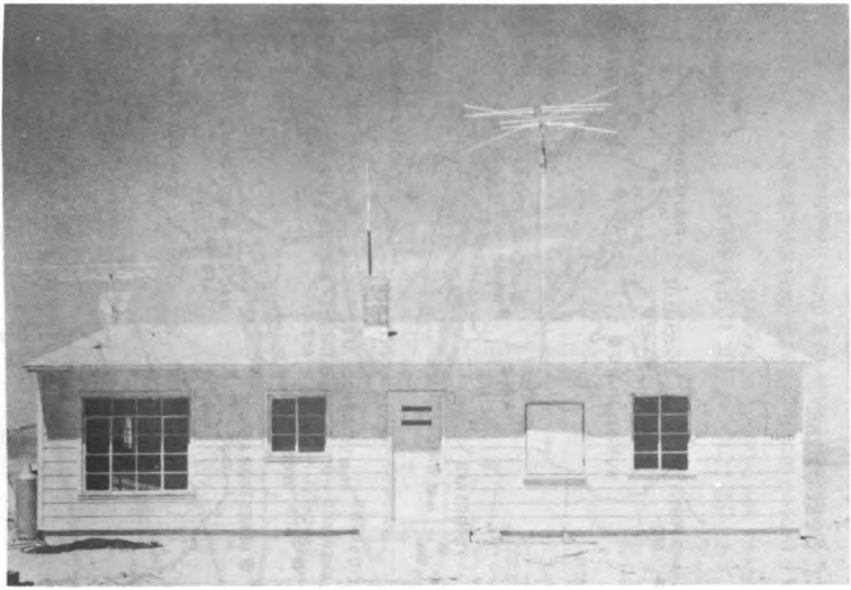
EXAMPLES OF DAMAGE PRODUCED BY 5 PSI

[Reprinted from "The Effects of Nuclear Weapons," Samuel Glasstone, Ed. April 1962.]



Unreinforced brick house before a nuclear explosion, Nevada Test Site.

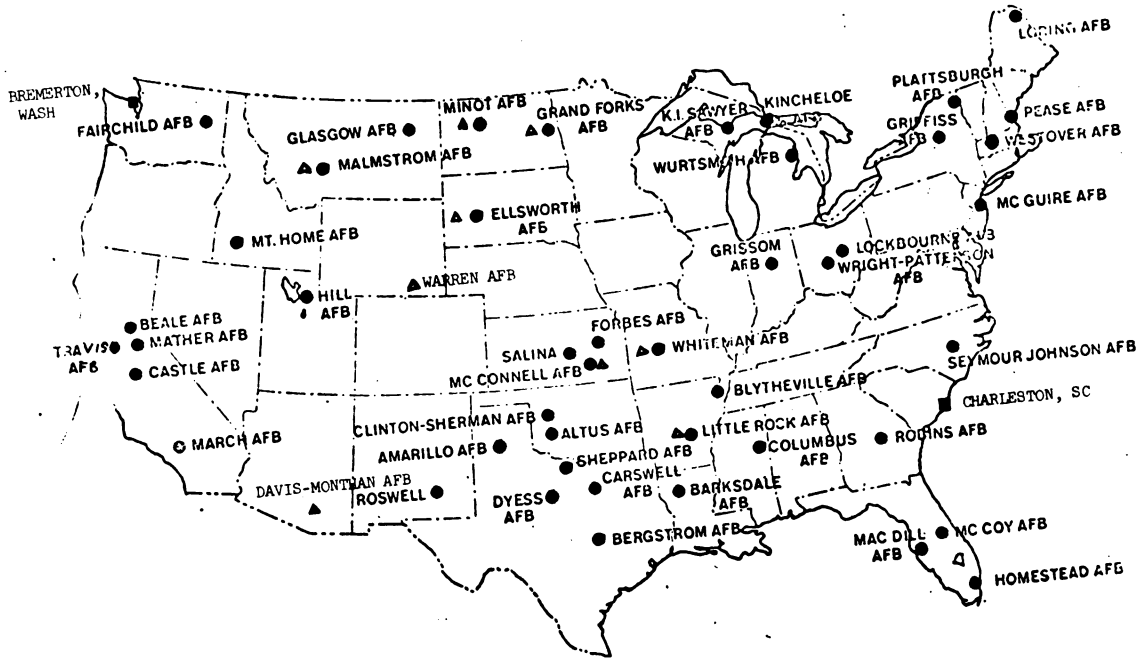
Unreinforced brick house after a nuclear explosion (5 psi over pressure).

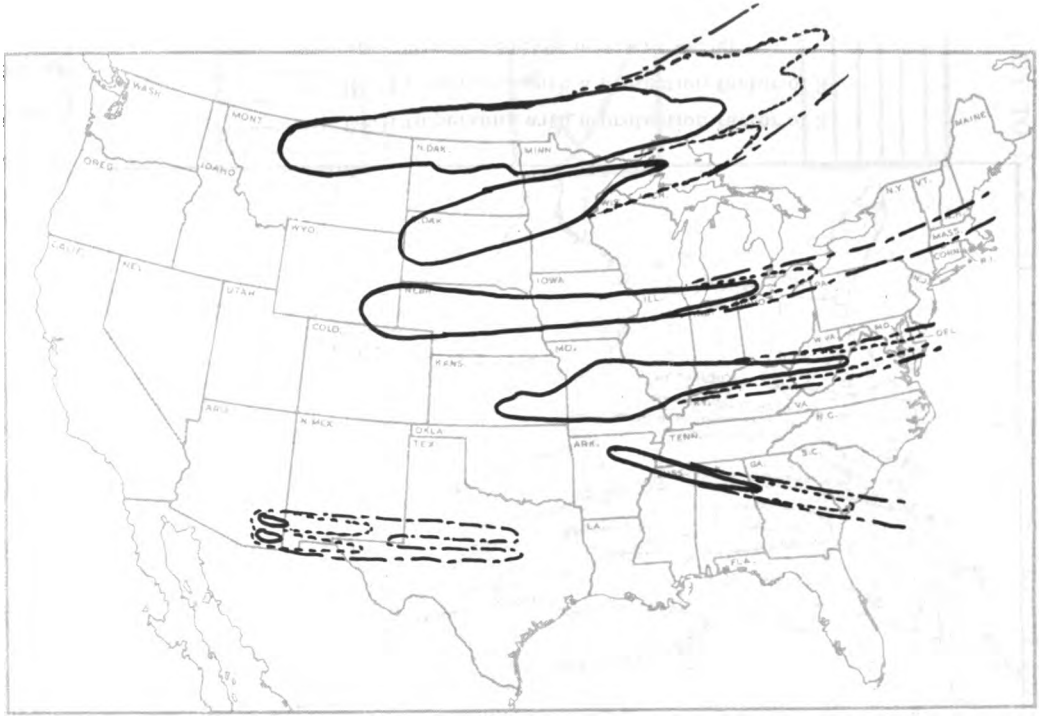


Rambler-type house before a nuclear explosion, Nevada Test Site. (Note blast door over bathroom window at right.)

Rambler-type house after a nuclear explosion (5 psi over pressure).

U.S. Target Structure





FALLOUT CONTOURS FOR AN ATTACK ON U.S. ICBM SILOS
(for detailed assumptions see page 47 of report)

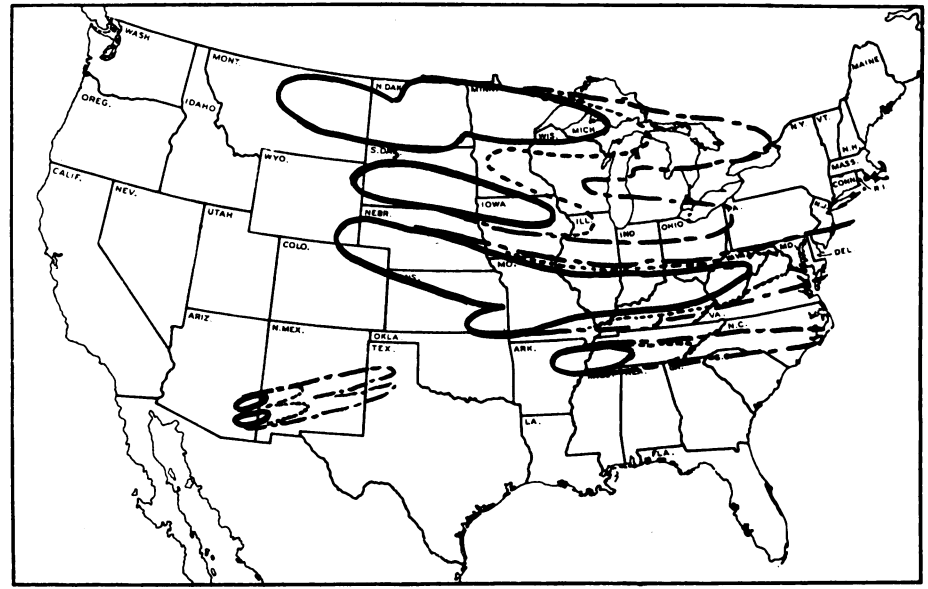
——— **450 REM to a person with a protection factor of 3 (50% fatalities)**

- - - - - - **200 REM to a person with a protection factor of 3 (50% hospitalized)**

——— — — **strontium-90 contamination exceeds 2 microcuries per squre meter (current ERDA standard for use of land for agriculture)**

FALLOUT PATTERNS FOR A "TYPICAL" WINTER DAY

This map illustrates the sensitivity of the fallout pattern to the characteristics of the winds blowing at the time of the attack. The patterns shown were calculated using the same assumptions as those used to produce the previous map but winds for a "typical" winter day were used instead of winds for a "typical" March day.

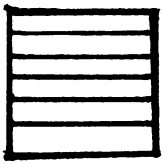


450 REM to persons with a protection factor of 3

200 REM to persons with a protection factor of 3

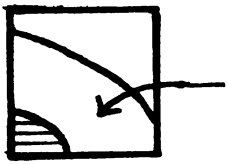
2 microcuries per square meter of Sr-90

KEY TO NUCLEAR ATTACK EFFECTS SHOWN ON FOLLOWING STATE MAPS



(A)

These areas would experience at least 4–5 pounds per square inch of blast pressure and wind speeds in excess of 120 mph. Most ordinary houses would be destroyed. (See the photographs on page 48–49).

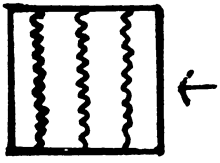


(B)

These areas would experience at least 2 pounds per square inch of blast pressure and wind speeds of nearly 70 mph. Most houses would be severely damaged.

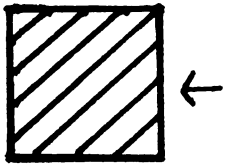
(C)

These areas would receive enough radiation to give a person with a protection factor of three an "acute dose" of at least 450 REM. This dose would result in at least 50 percent of the people in the area being killed by radiation sickness. Nearly everyone in the areas would need to be hospitalized. The cancer rate among the survivors would be roughly twice those of the rest of the population. The land in these areas would be contaminated with enough Strontium-90 to exceed the current ERDA standards for the use of land for agriculture by nearly a factor of ten.



(D)

These areas would receive enough radiation to give a person with a protection factor of three an "acute dose" of at least 200 REM. Nearly 50 percent of the people exposed to these levels of radiation would require immediate hospitalization and about 3 percent would die from radiation sickness (assuming that adequate medical services were available). The survivors would contract cancer at a rate approximately 25 percent higher than the rest of the population. Strontium-90 contamination would exceed current standards for agriculture by a factor of more than five.



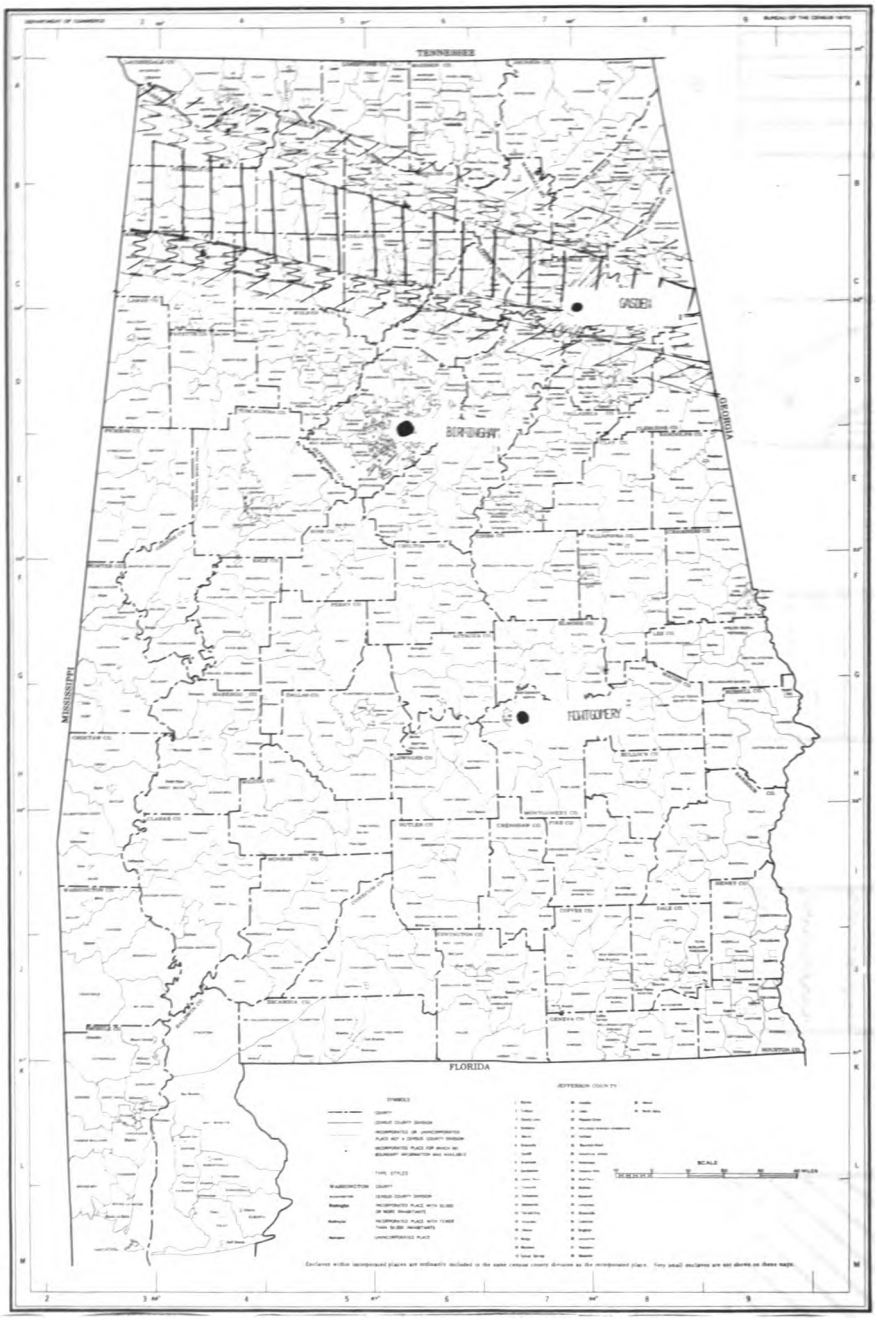
(E)

These areas would receive enough Strontium-90 to exceed current ERDA standards for agriculture (two microcuries per square meter).

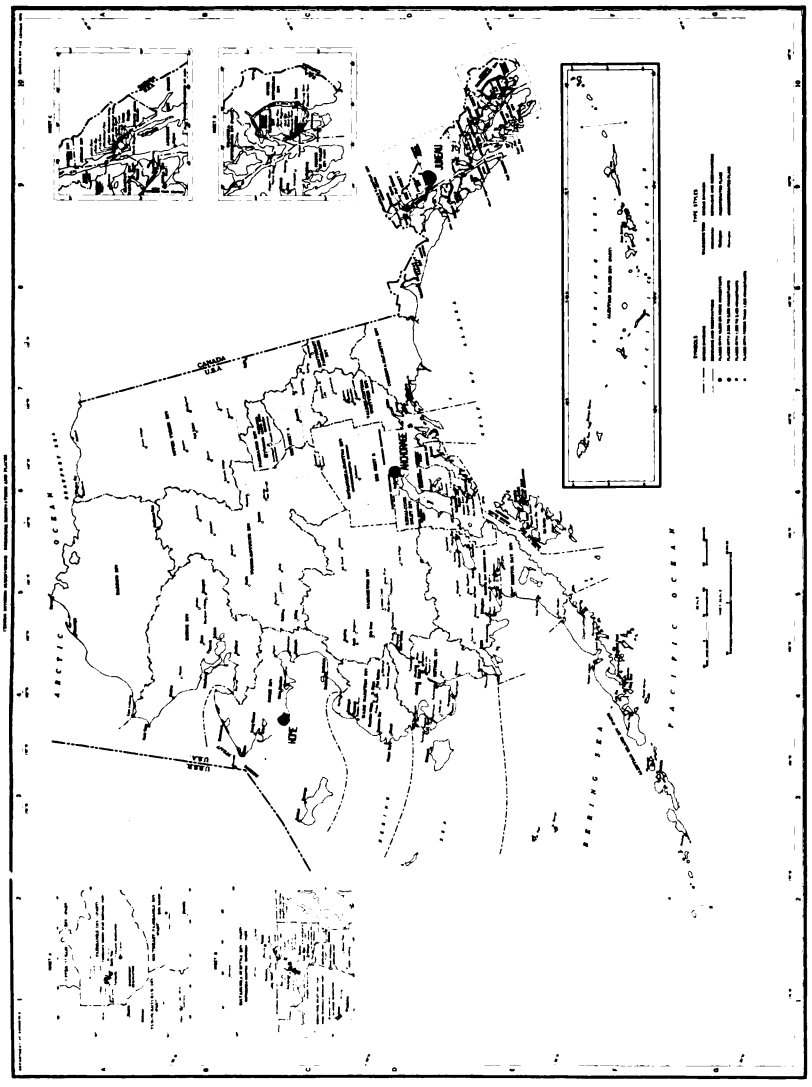
NOTE: Contours shown on the state maps were drawn using the assumptions indicated on page 47 of this report. The winds used in the calculation are the same as those used to prepare the U.S. map on page 51.

MAP 1

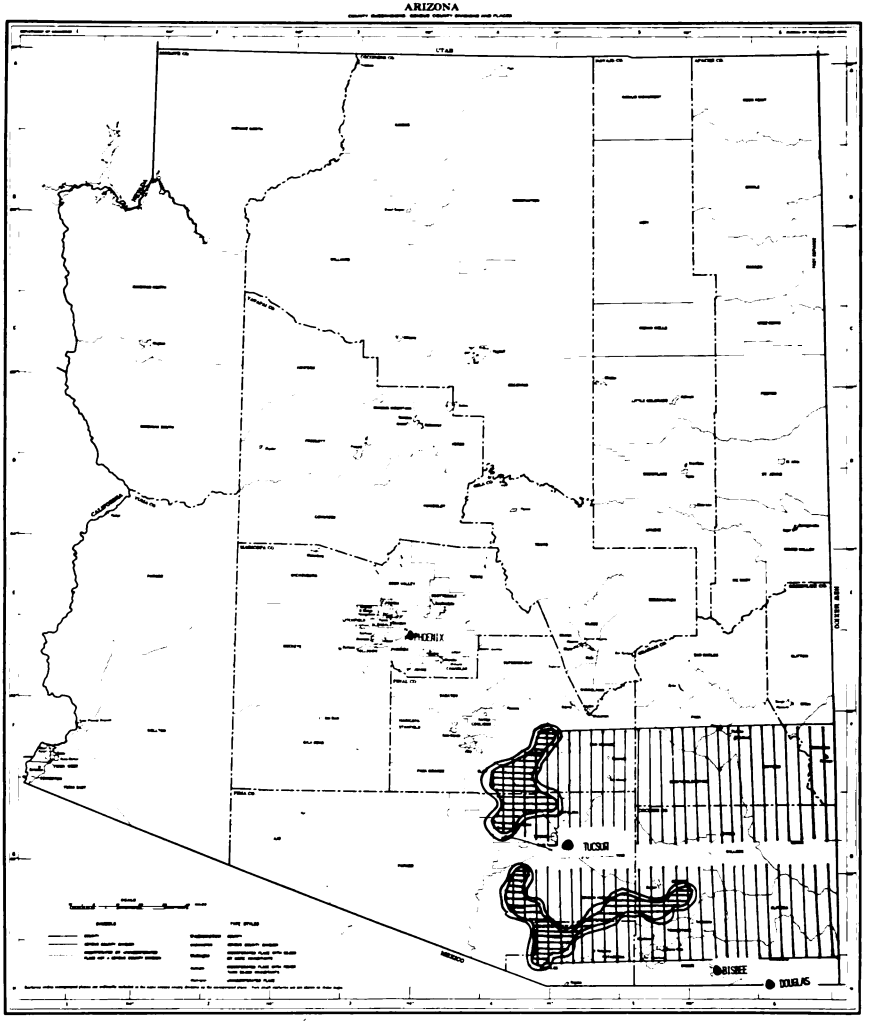
ALABAMA



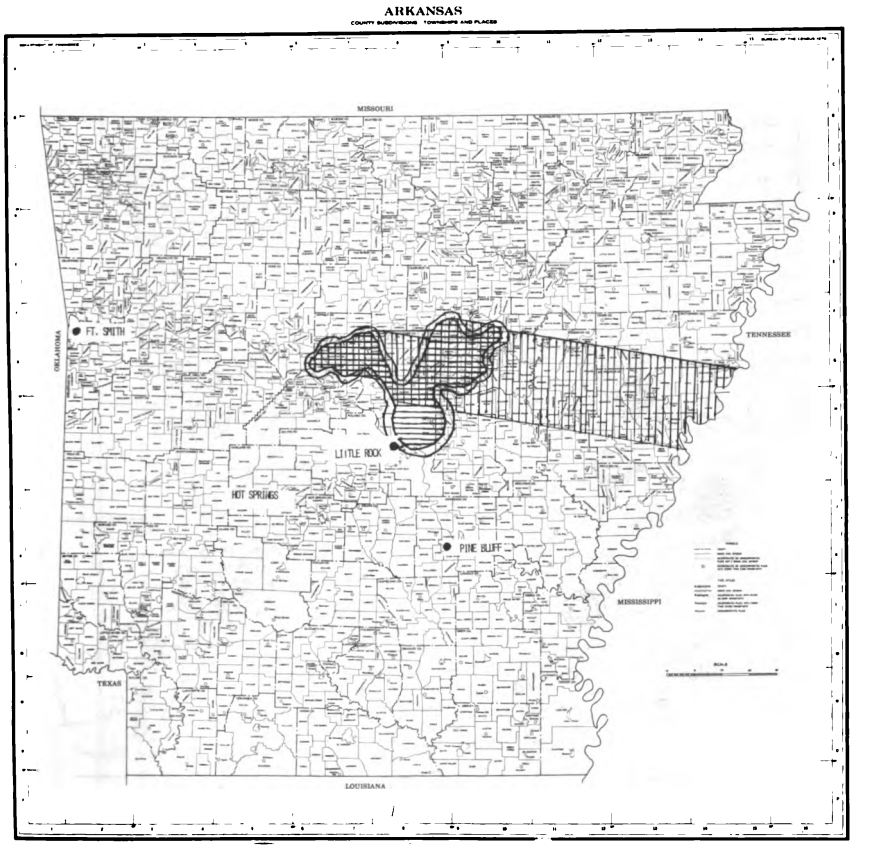
MAP 2



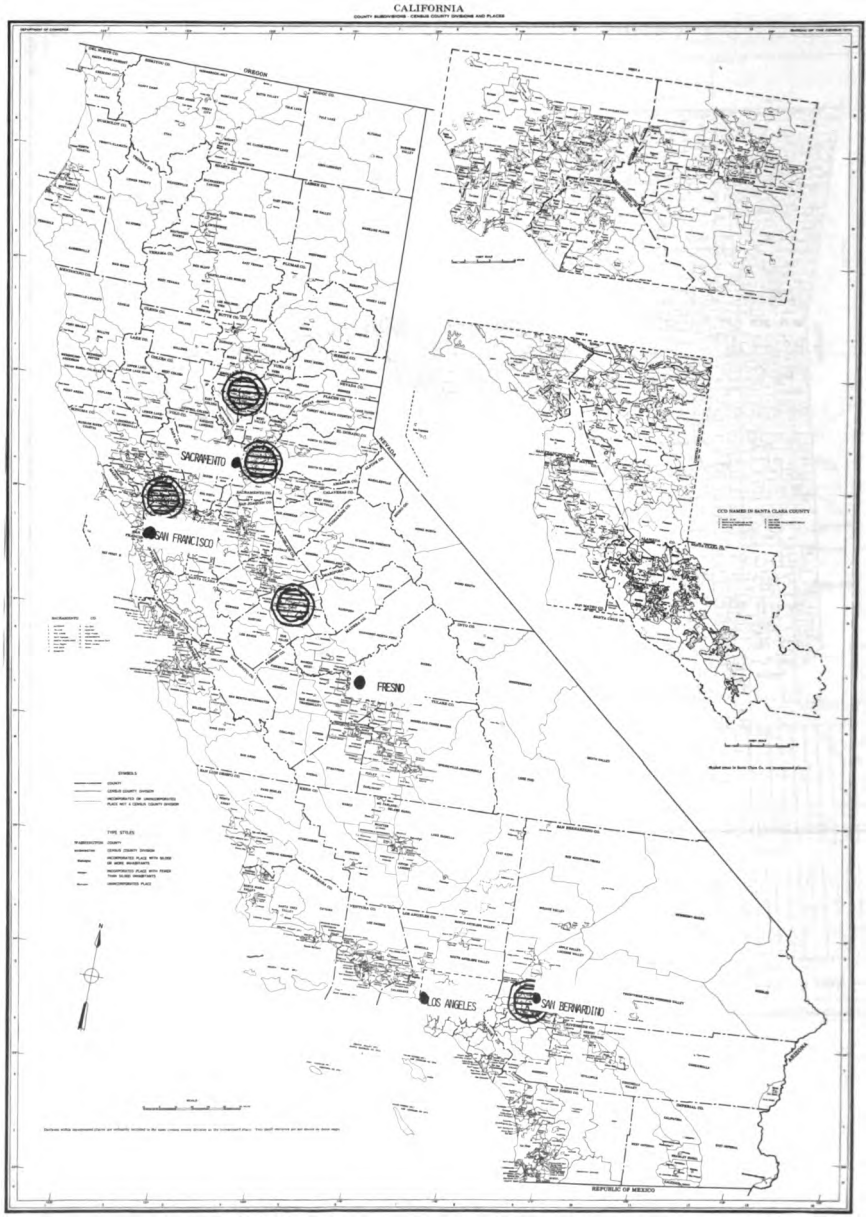
MAP 3



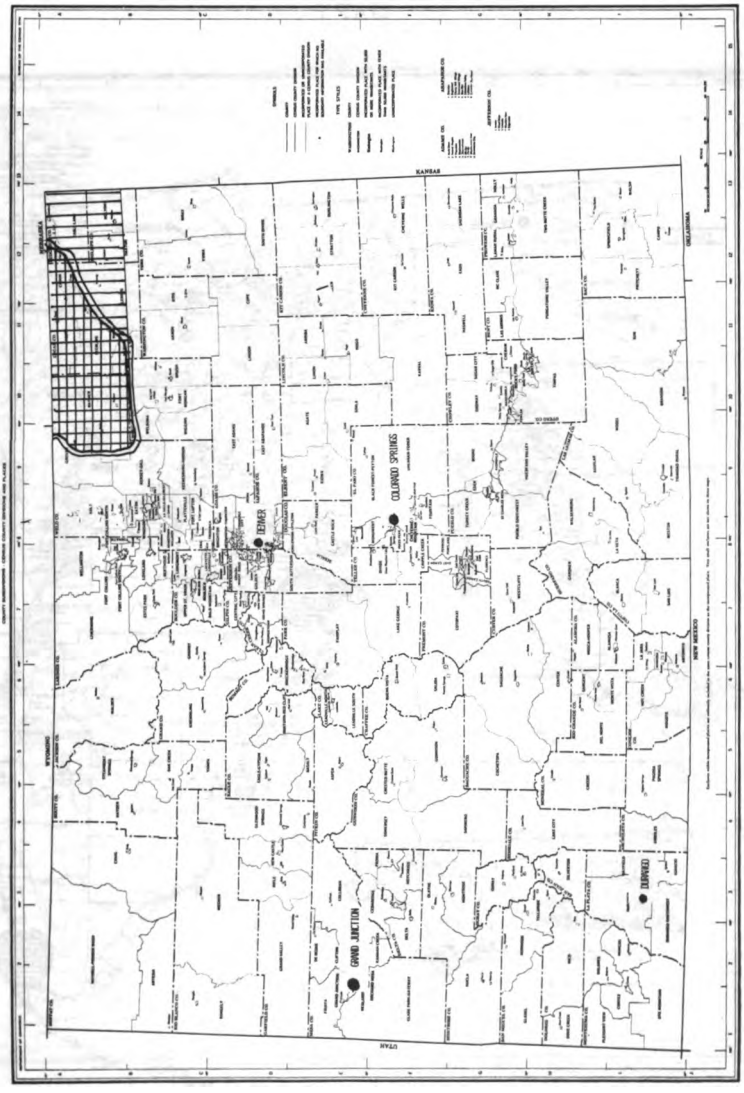
MAP 4



MAP 5



MAP 6



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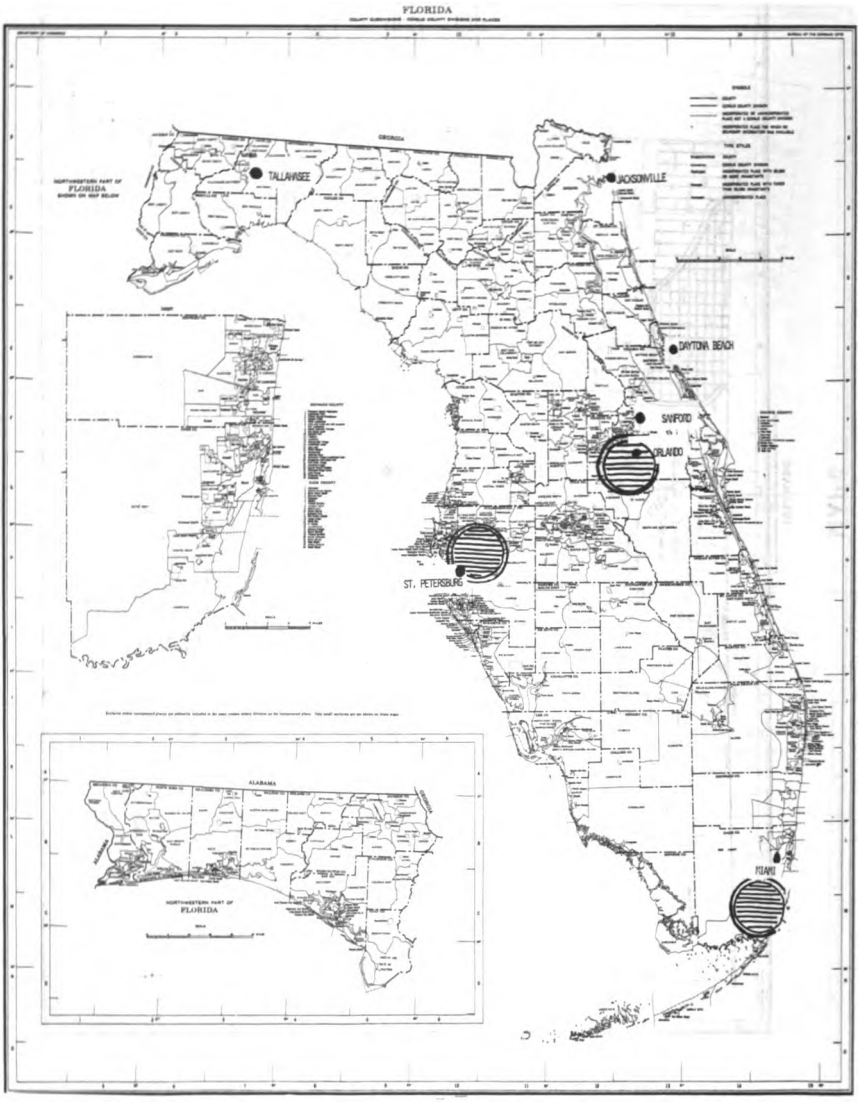
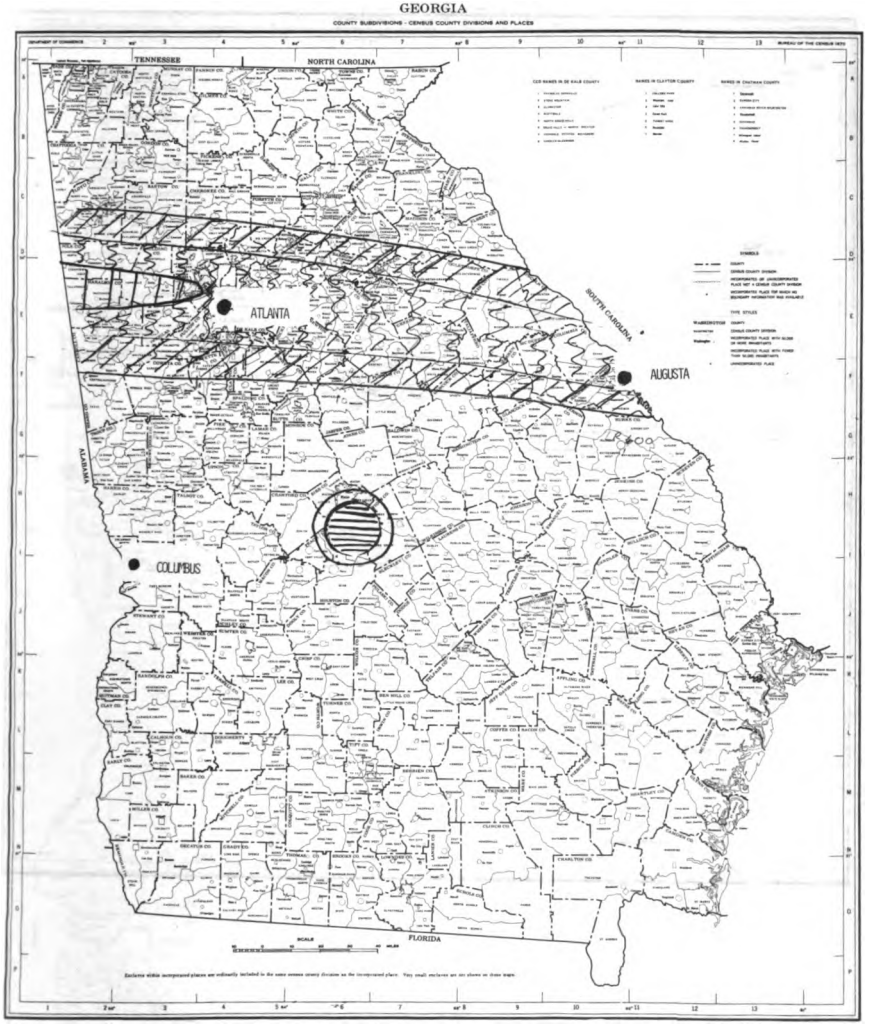
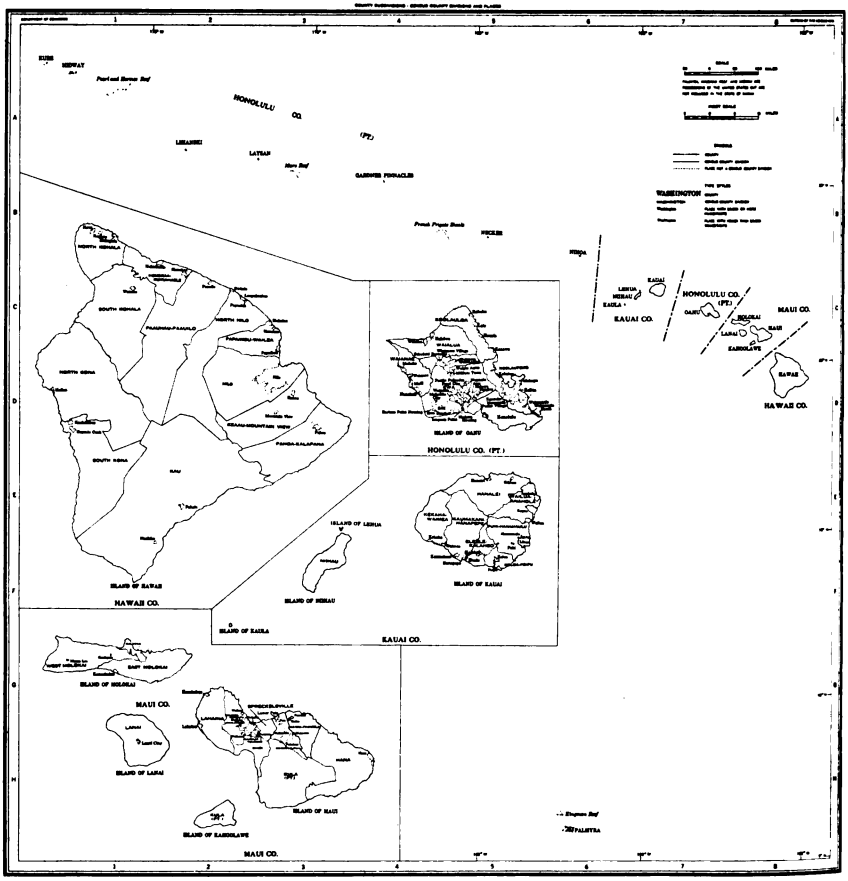
MAP 7



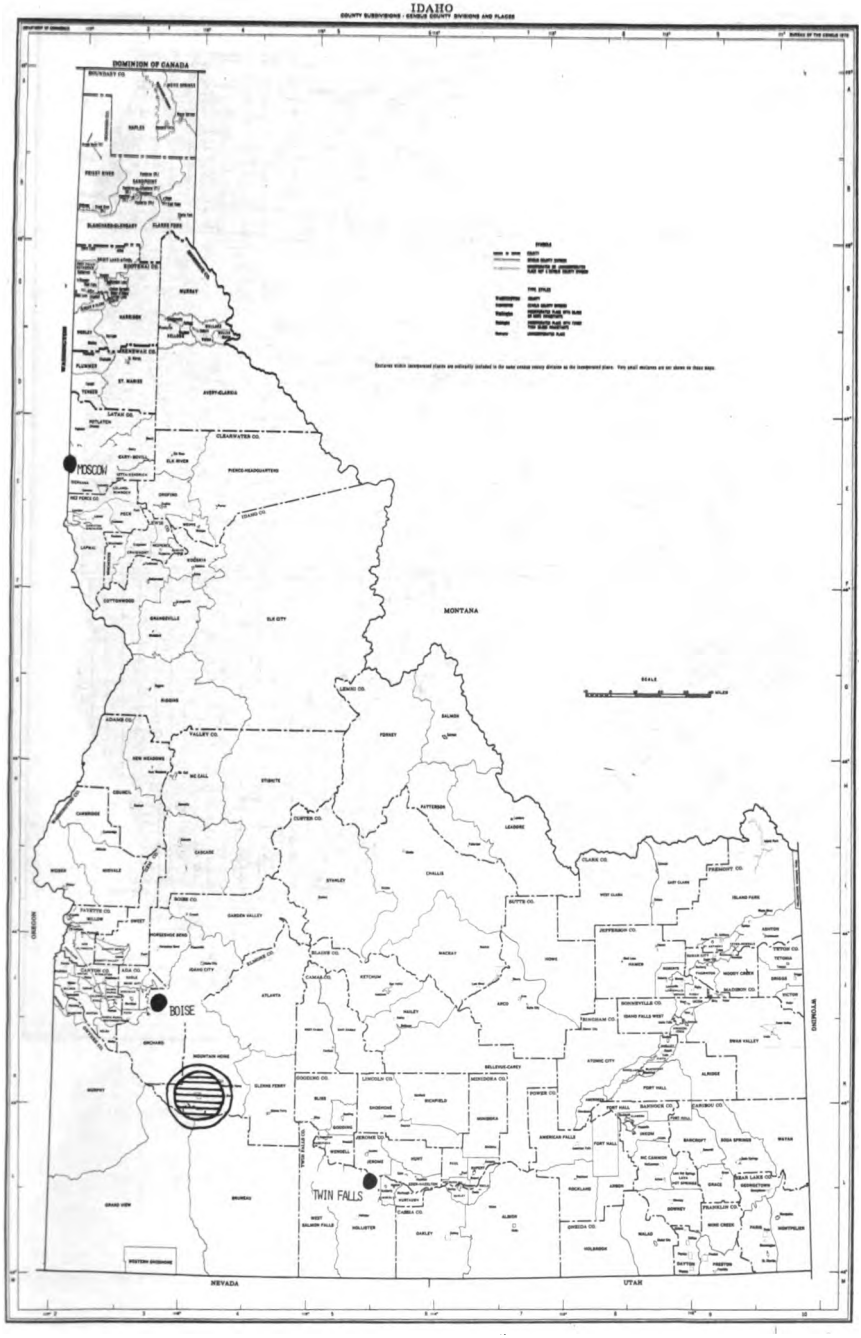
MAP 8



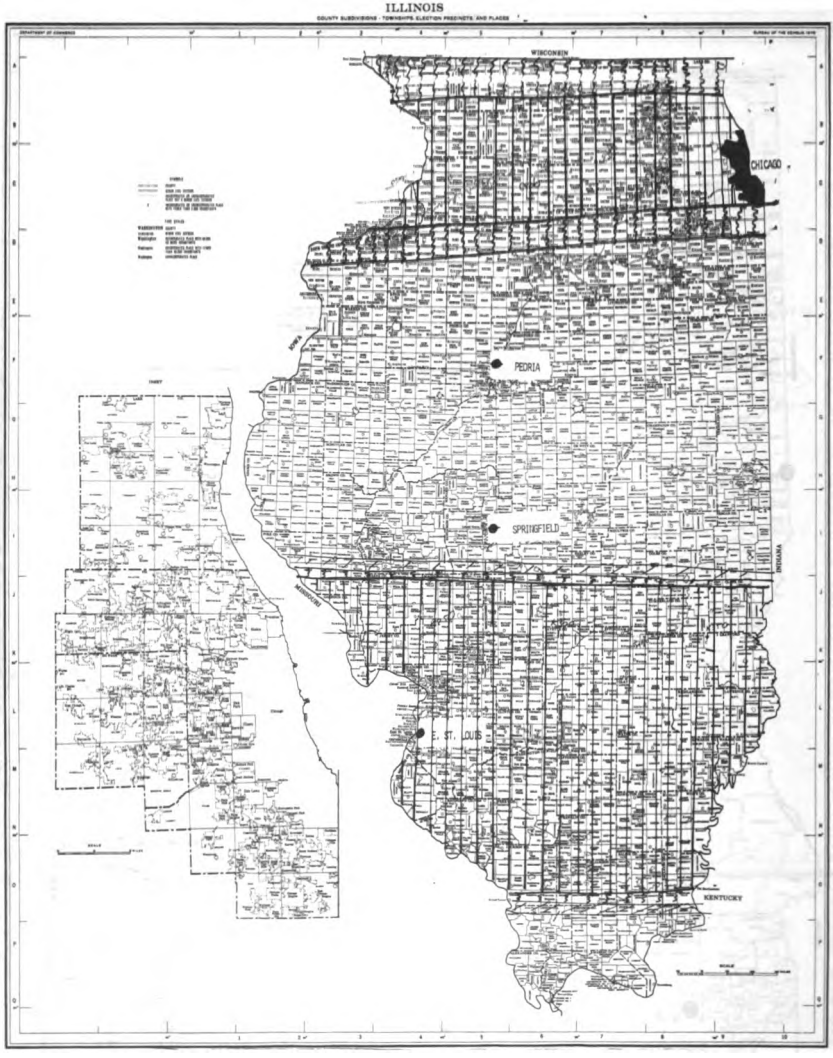
MAP 9



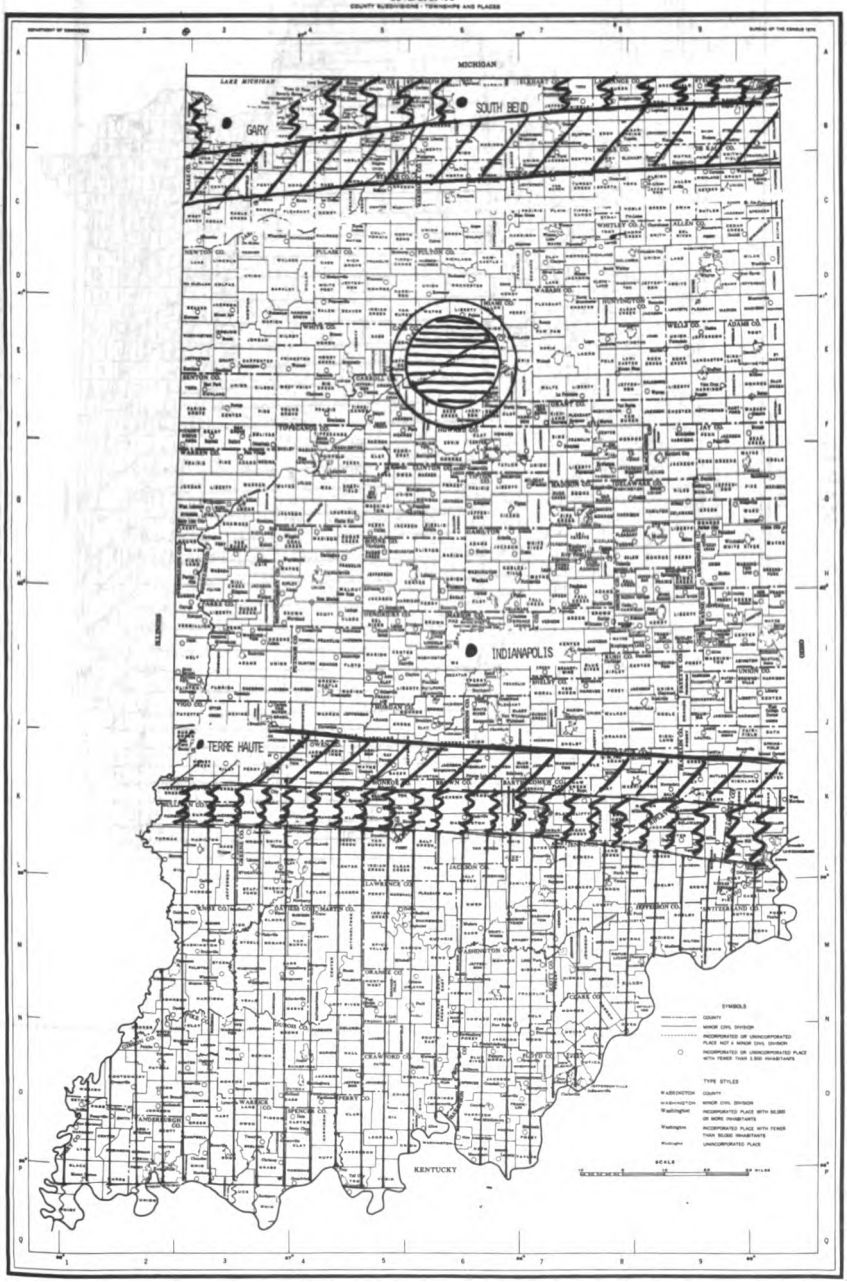
MAP 10



MAP 11

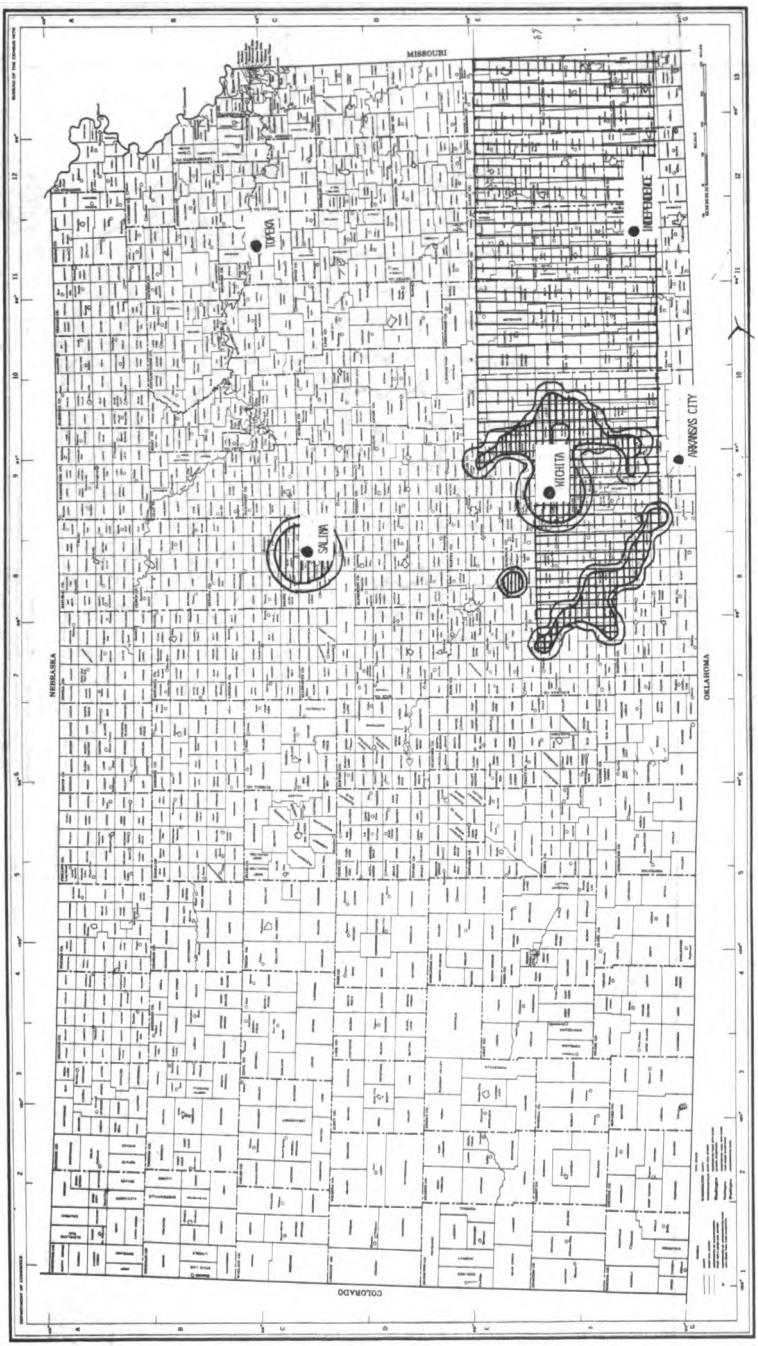


MAP 12



MAP 13

MAP 14



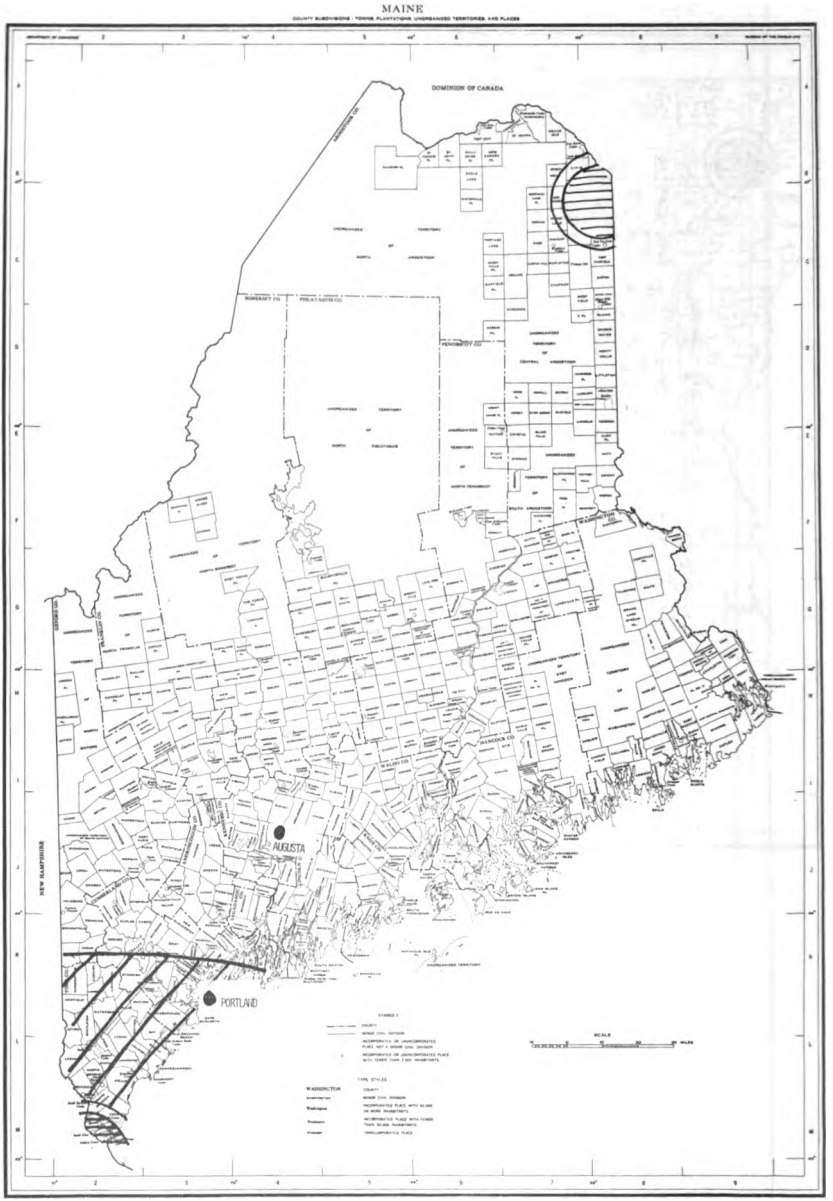
MAP 15

KENTUCKY

COUNTY SUBDIVISIONS · CENSUS COUNTY DIVISIONS AND PLACES

MAP 16

MAP 17



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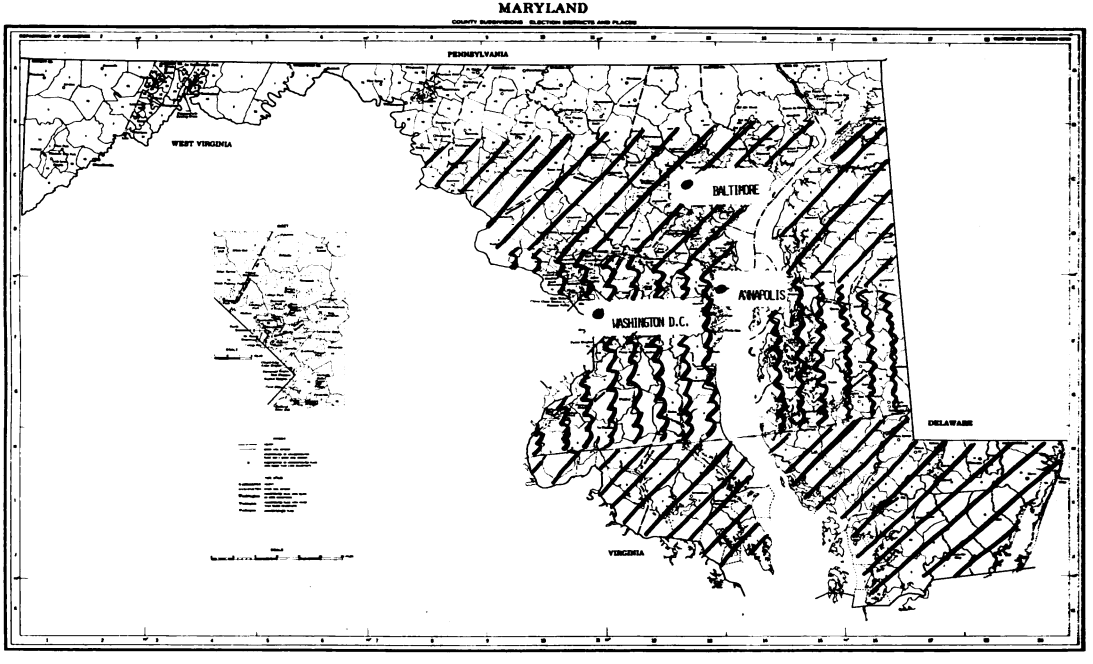

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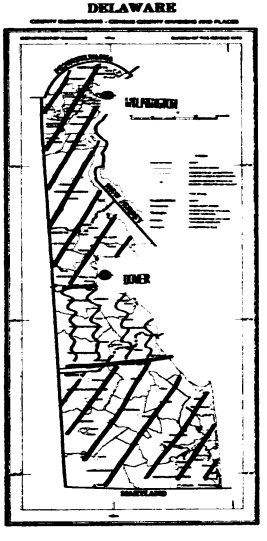
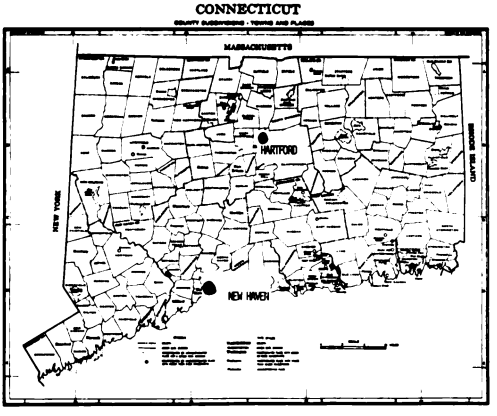


MAP 20

MAP 21



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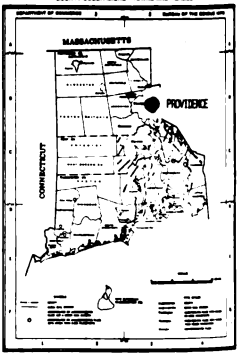
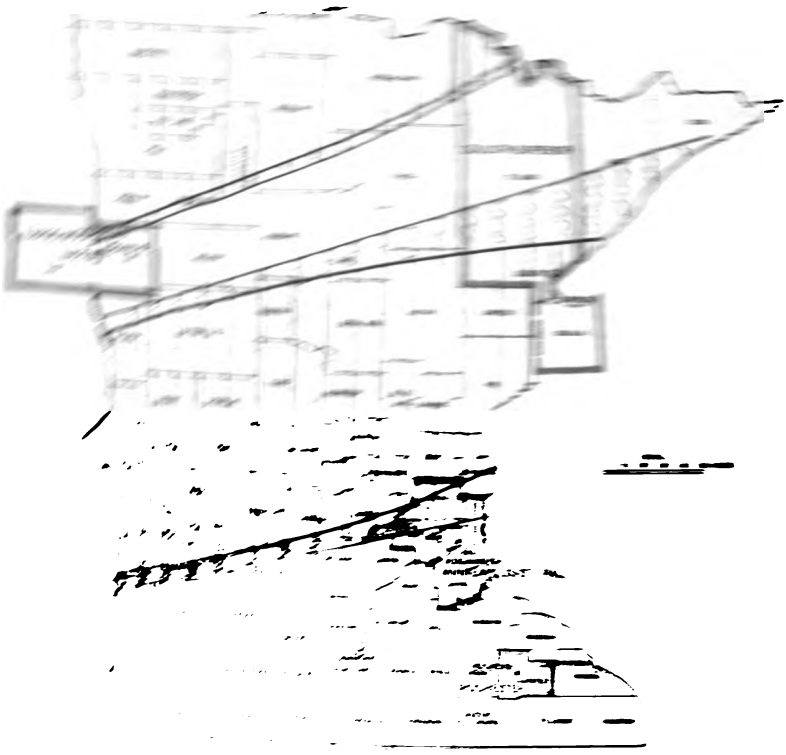


MAP 23

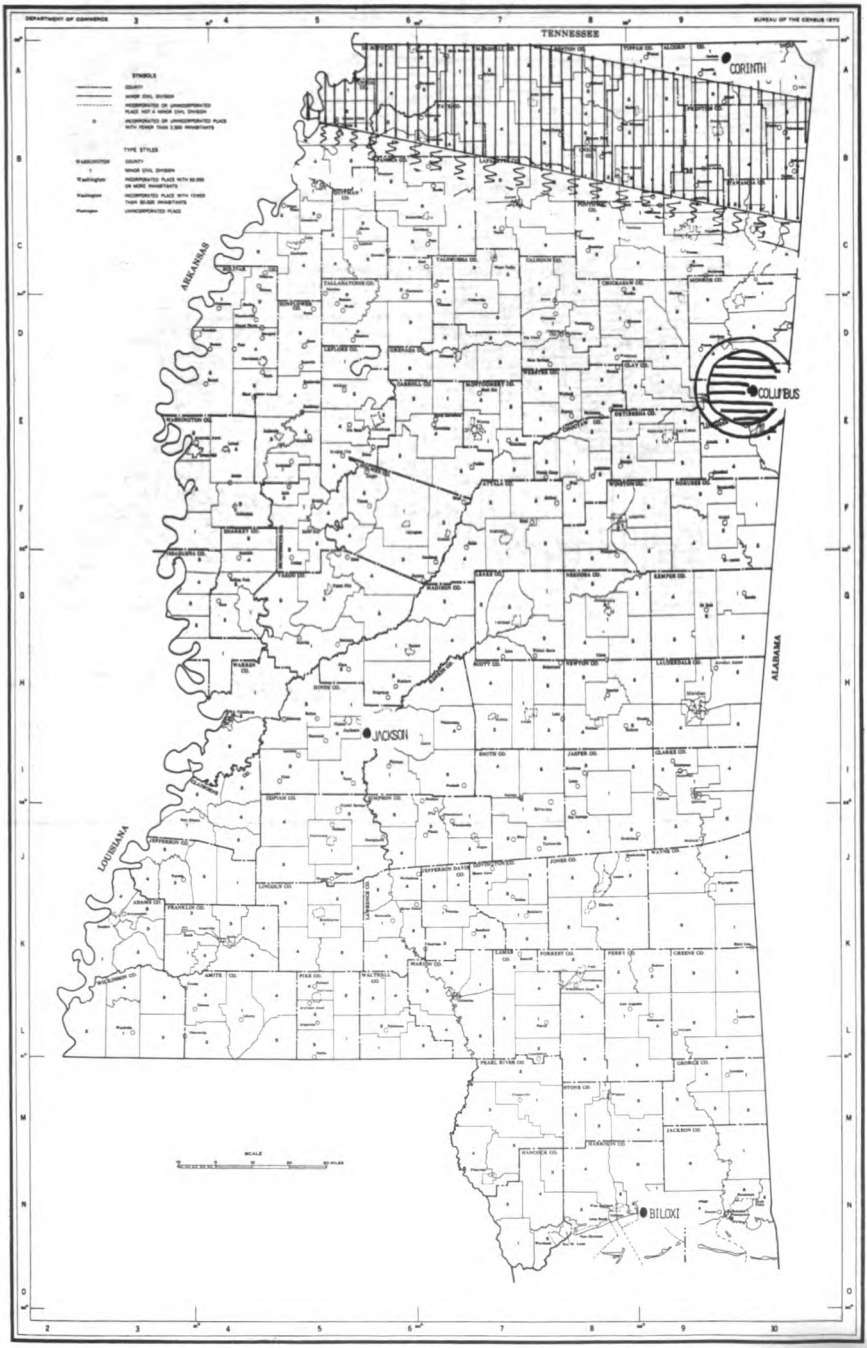
MICHIGAN



MAP 25

MISSISSIPPI

COUNTY SUBDIVISIONS - SUPERVISORS DISTRICTS AND PLACES



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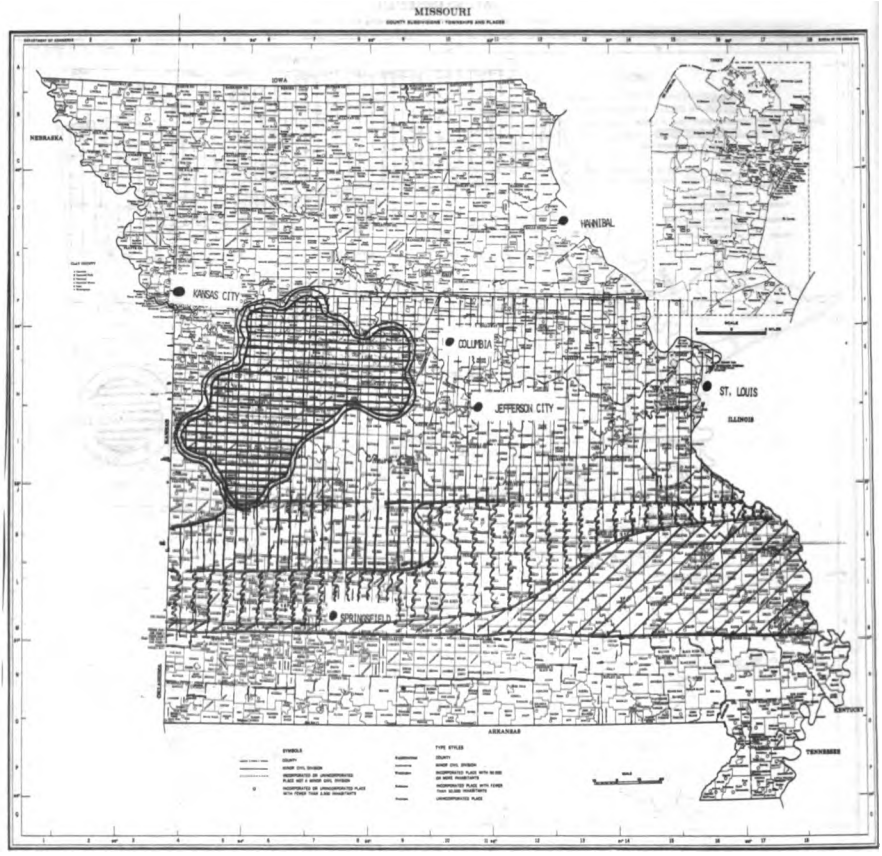
MAP 26



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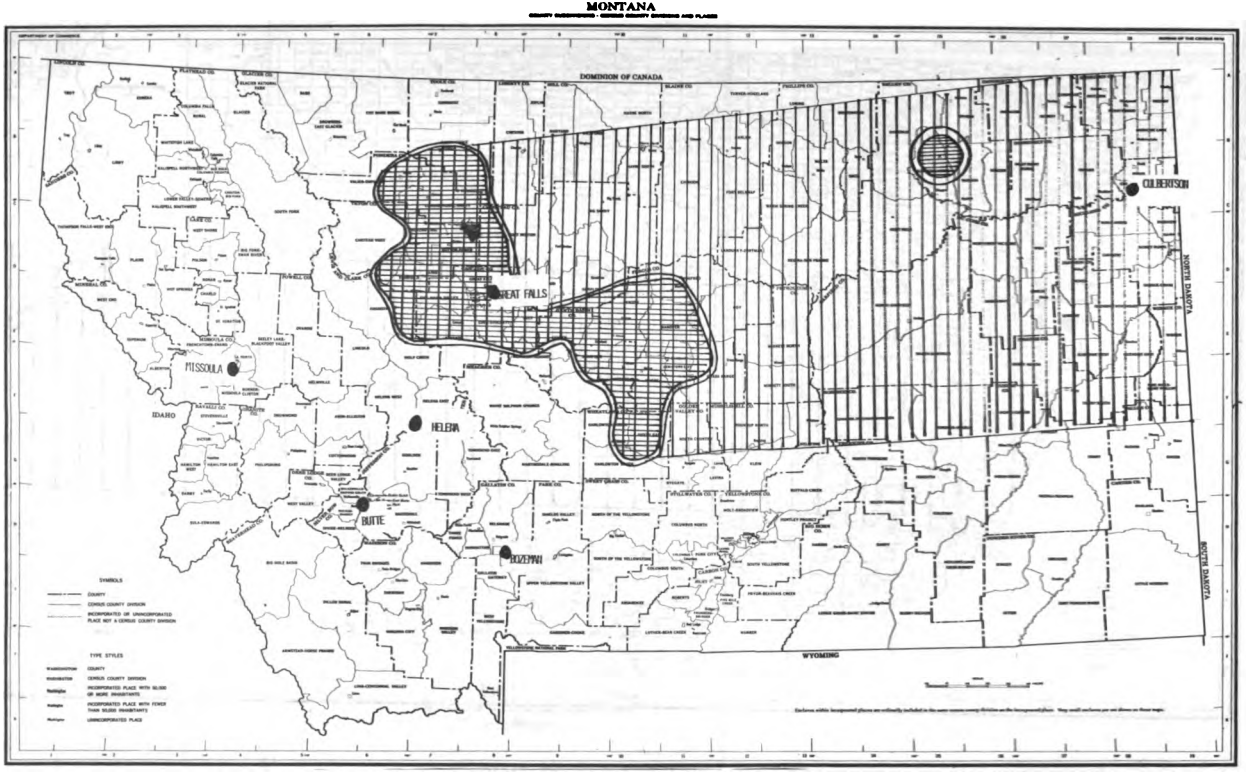

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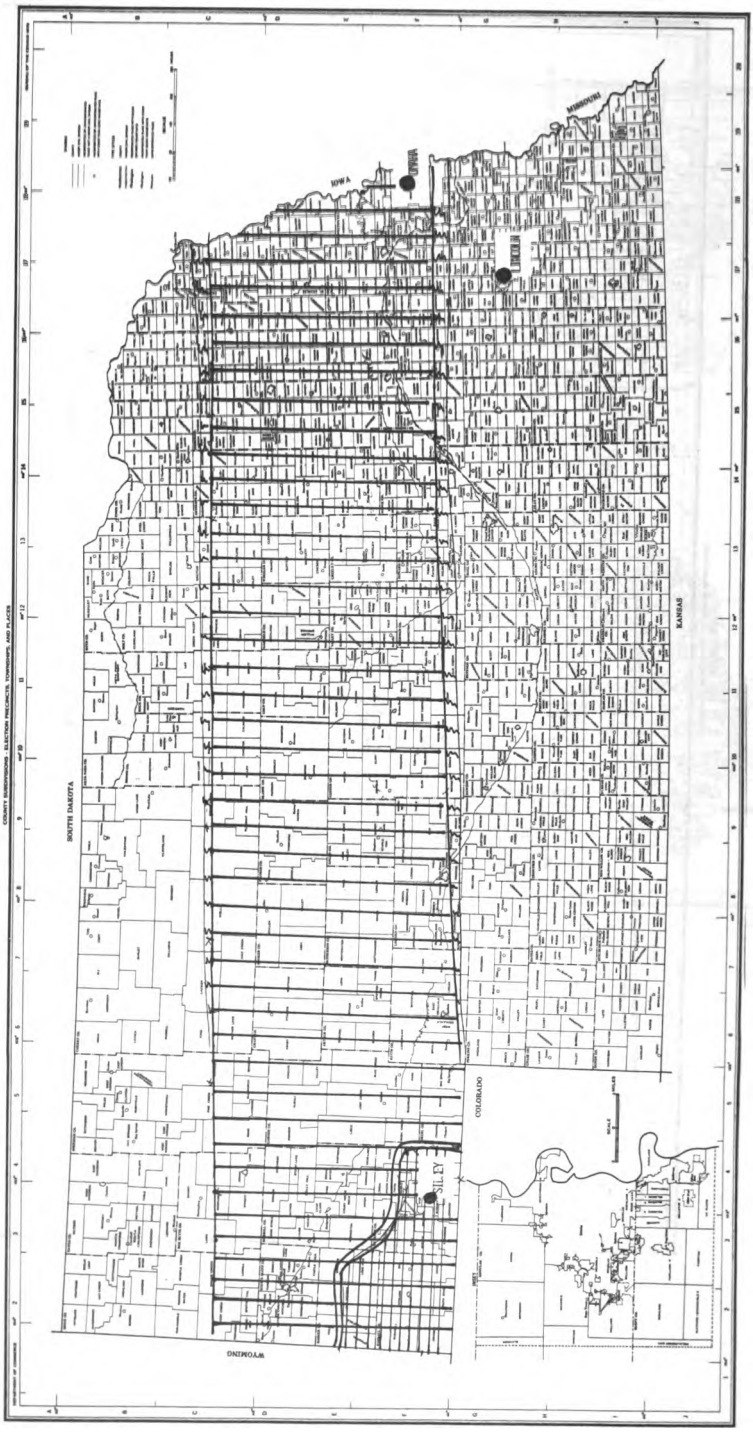
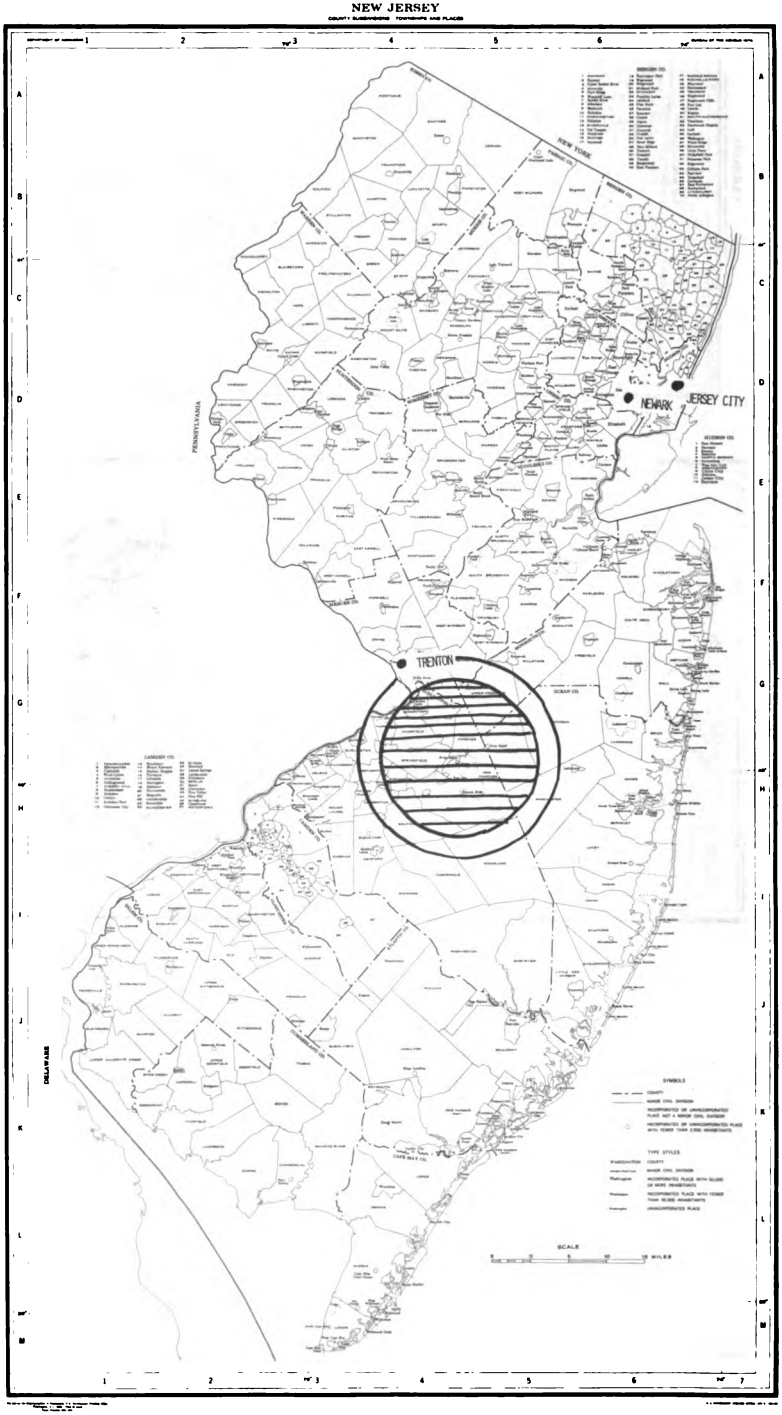


MAP 30

MAP 29

MAP 31



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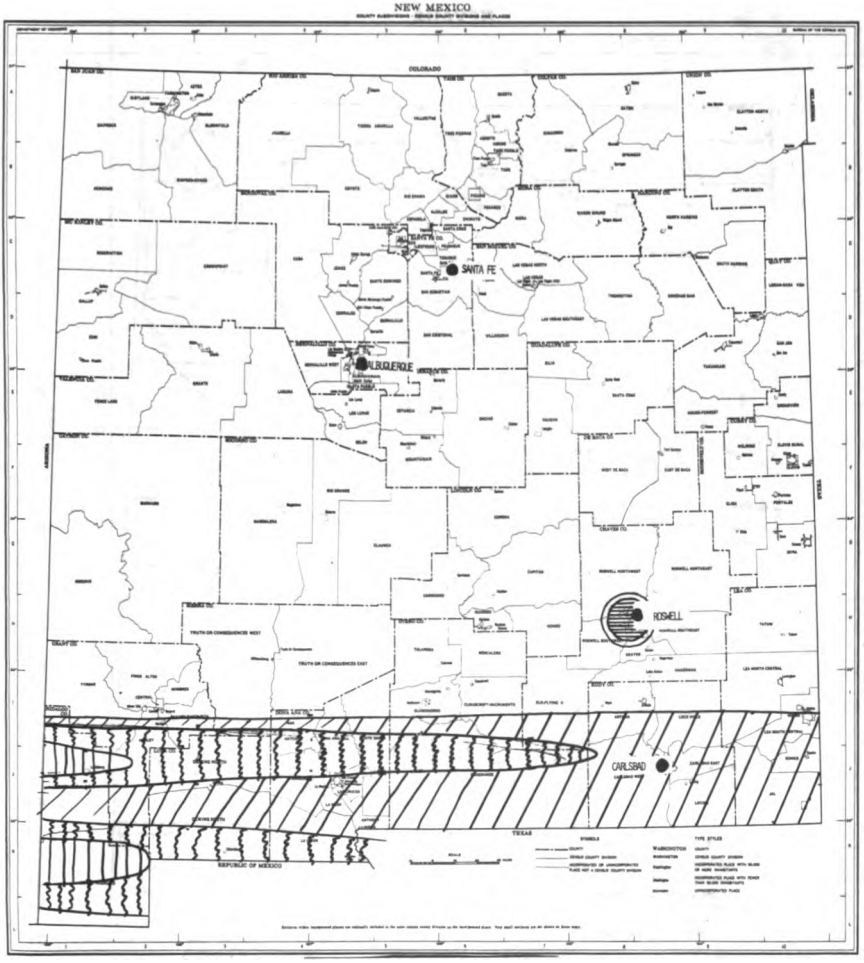
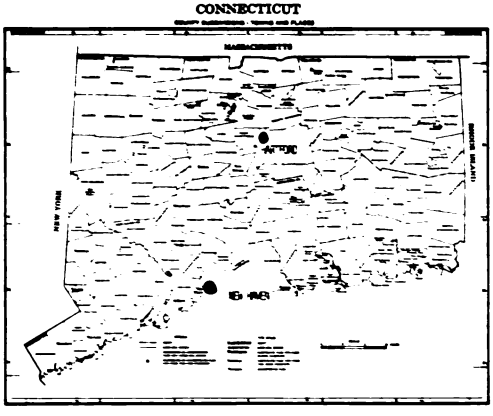


MAP 20

MAP 21



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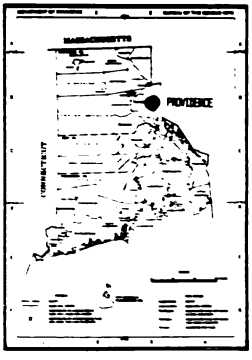
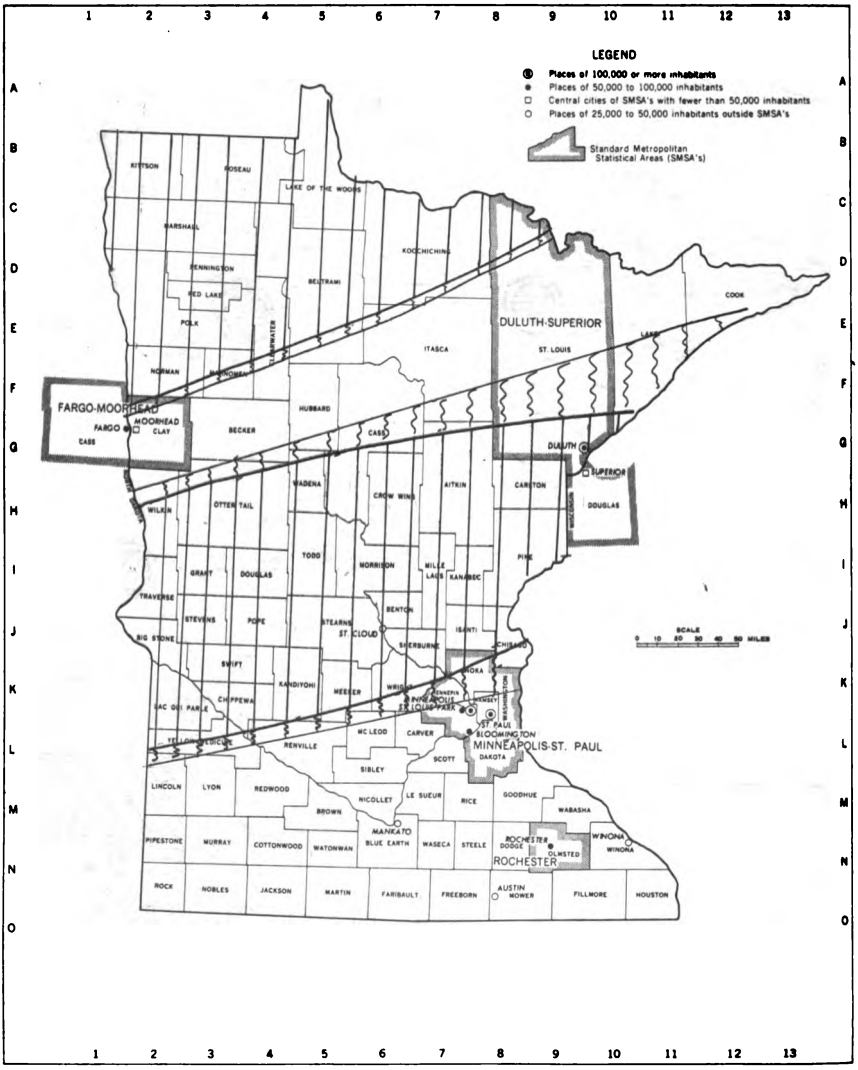


MAP 23

MAP 24

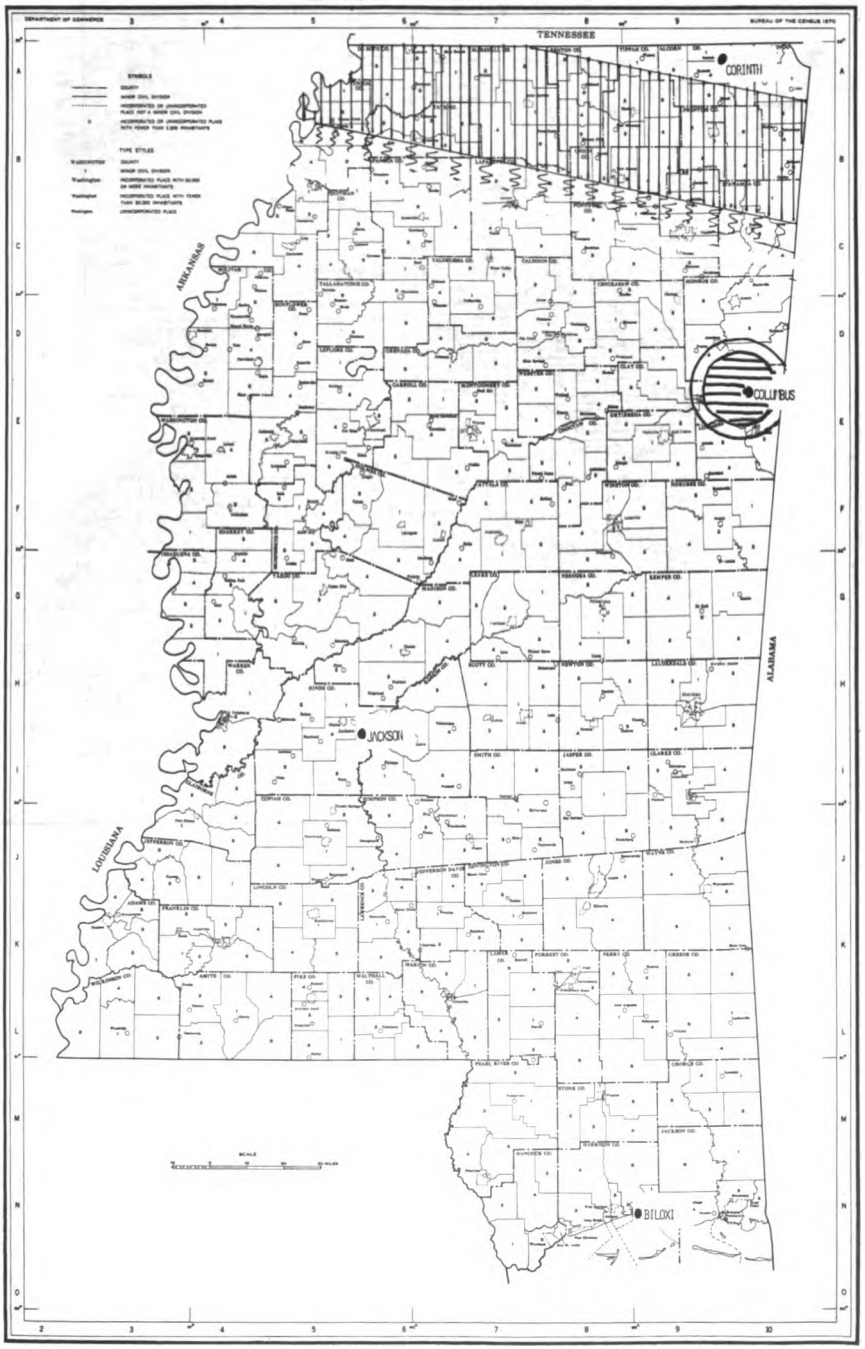
MINNESOTA



MAP 25

MISSISSIPPI

COUNTY SUBDIVISIONS - SUPERVISORS DISTRICTS AND PLACES



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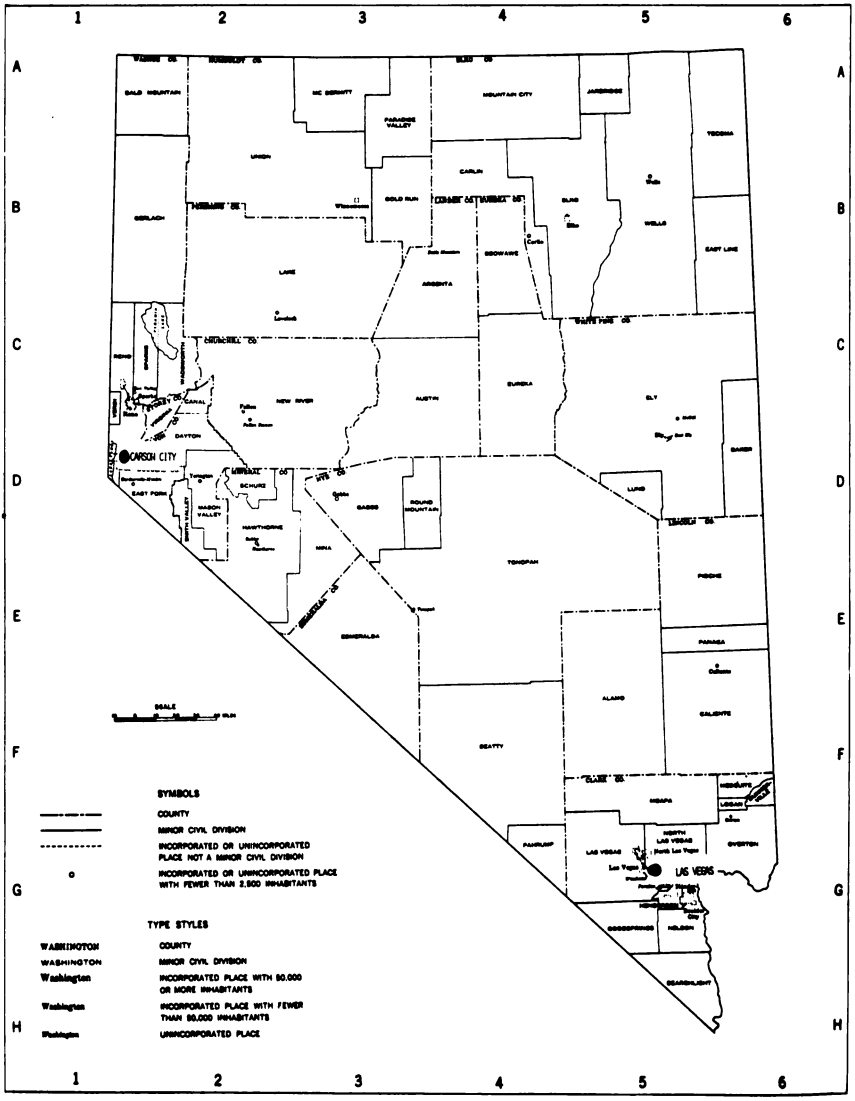
MAP 33

NEVADA



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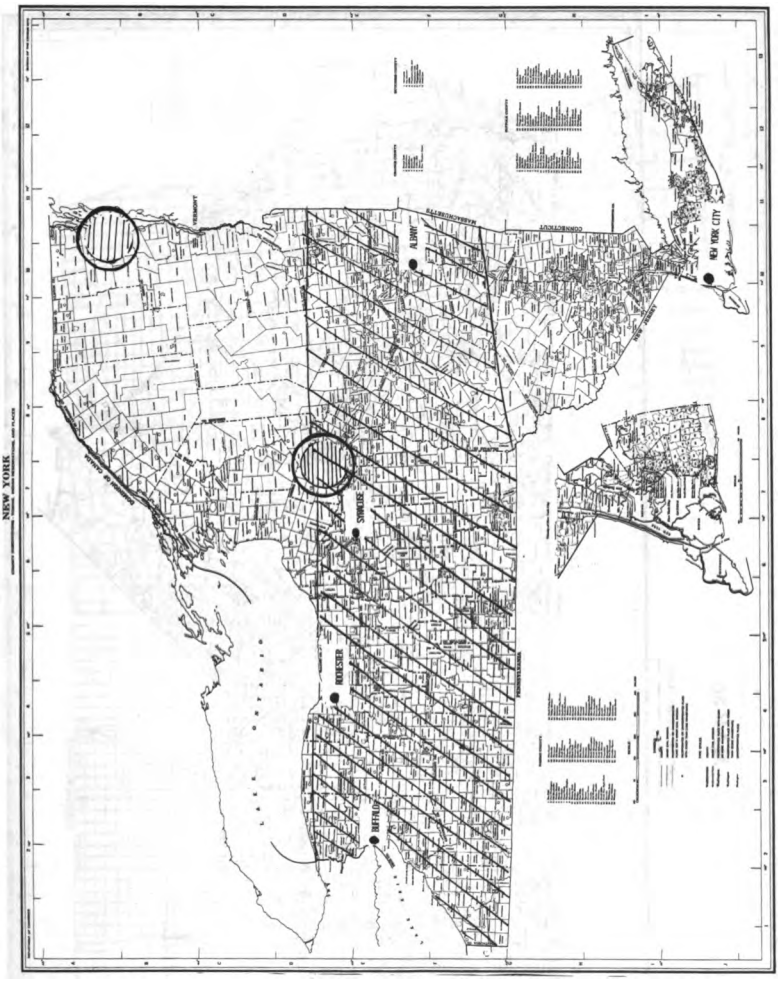

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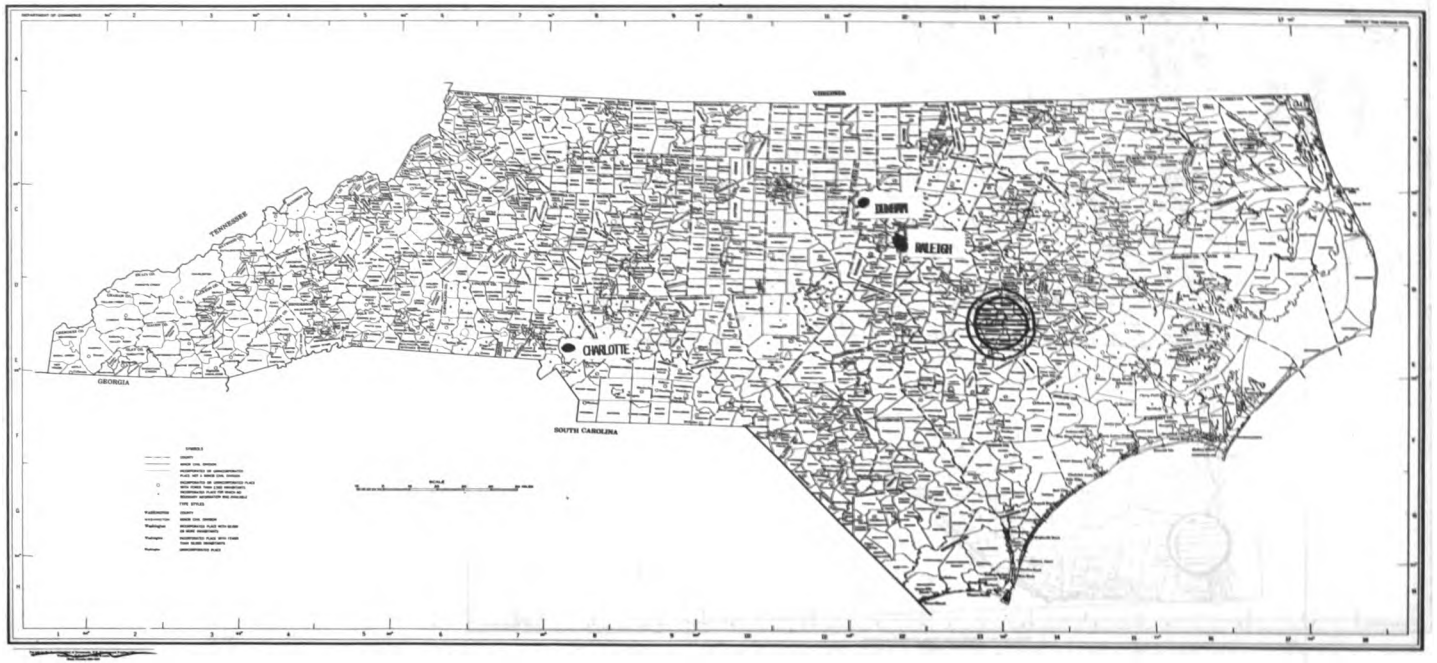
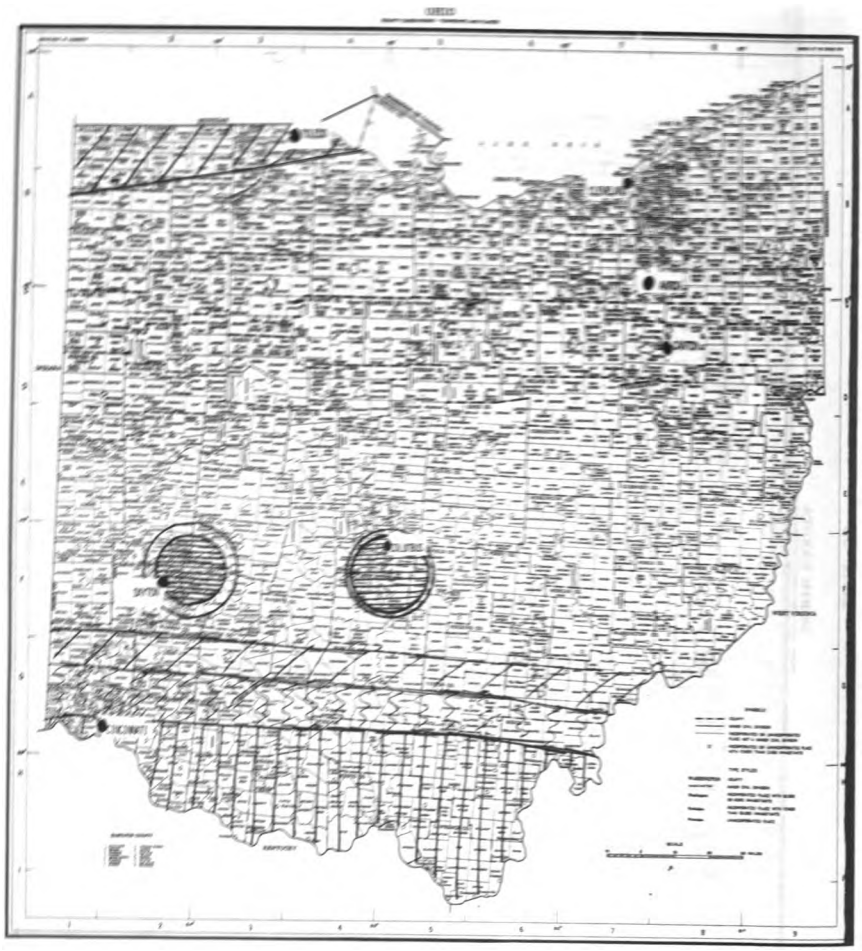
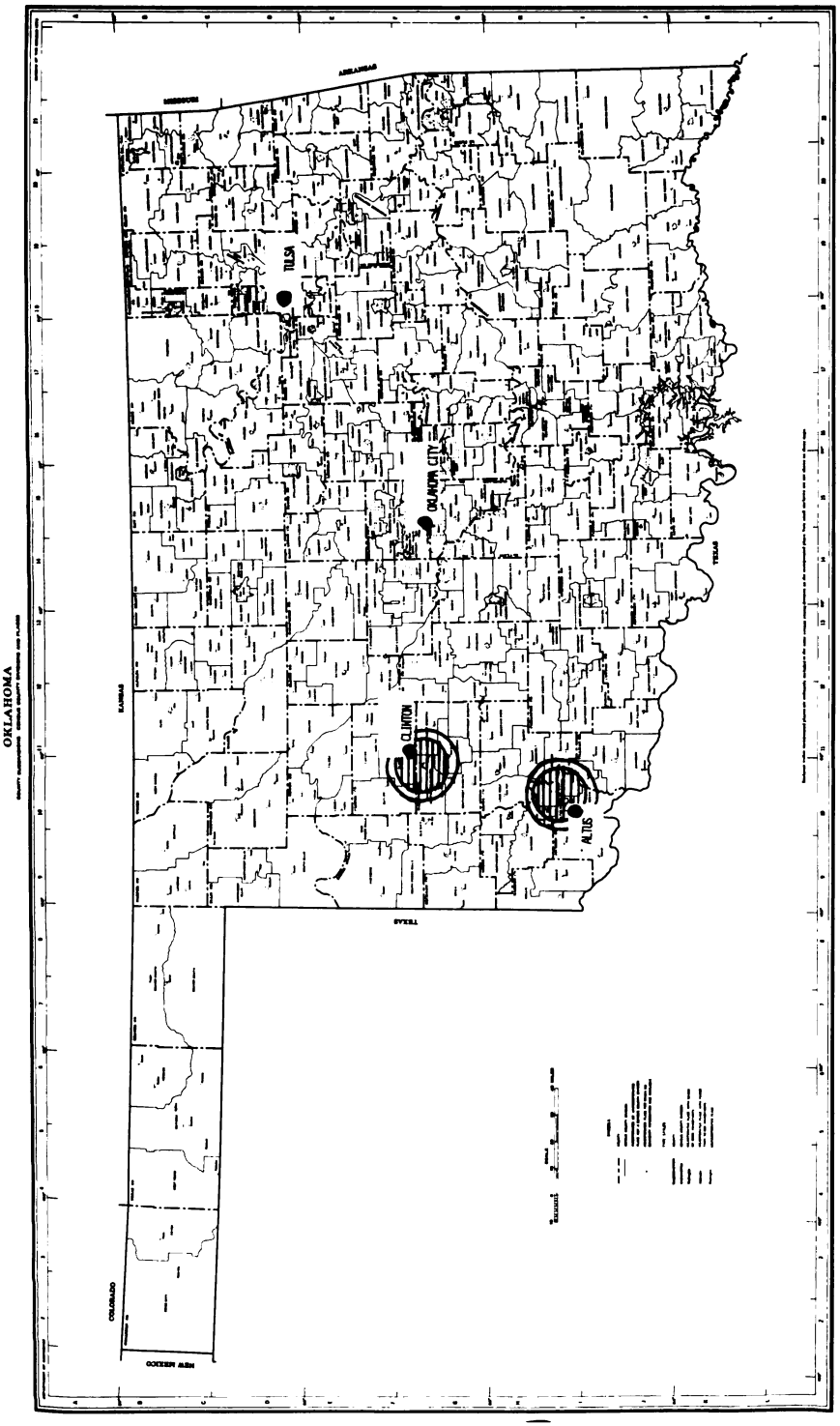


MAP 36

MAP 5.





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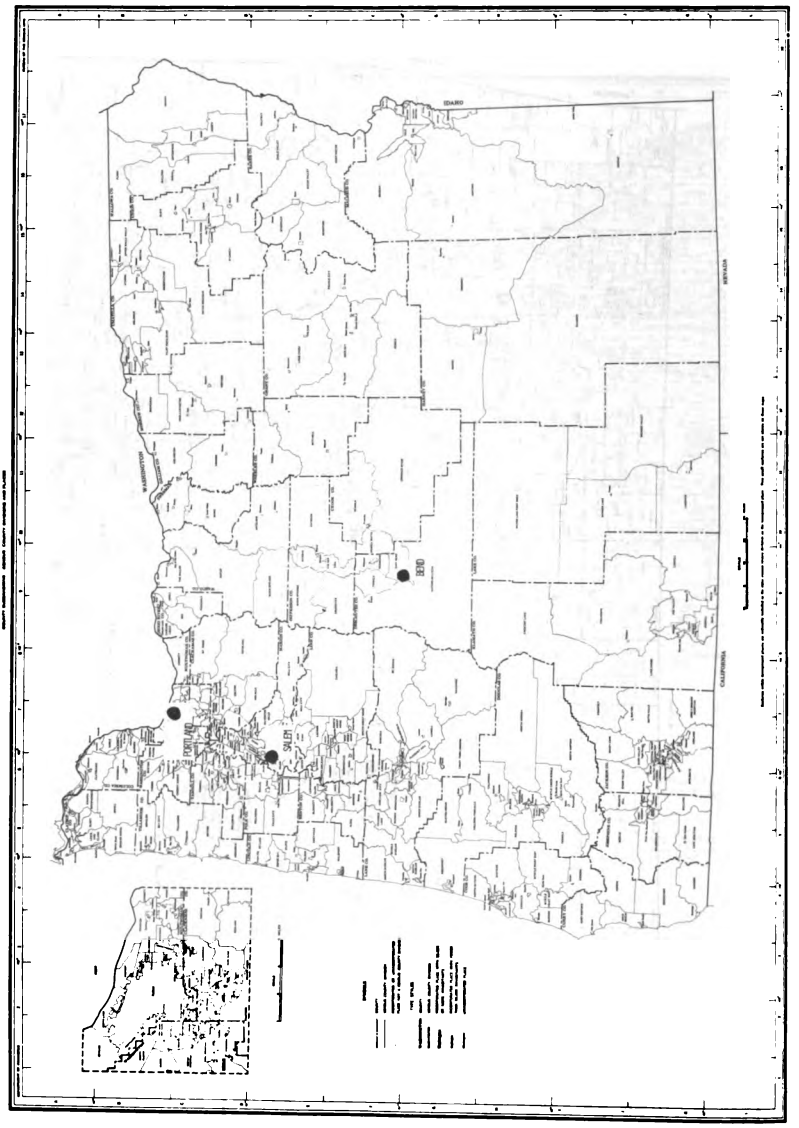

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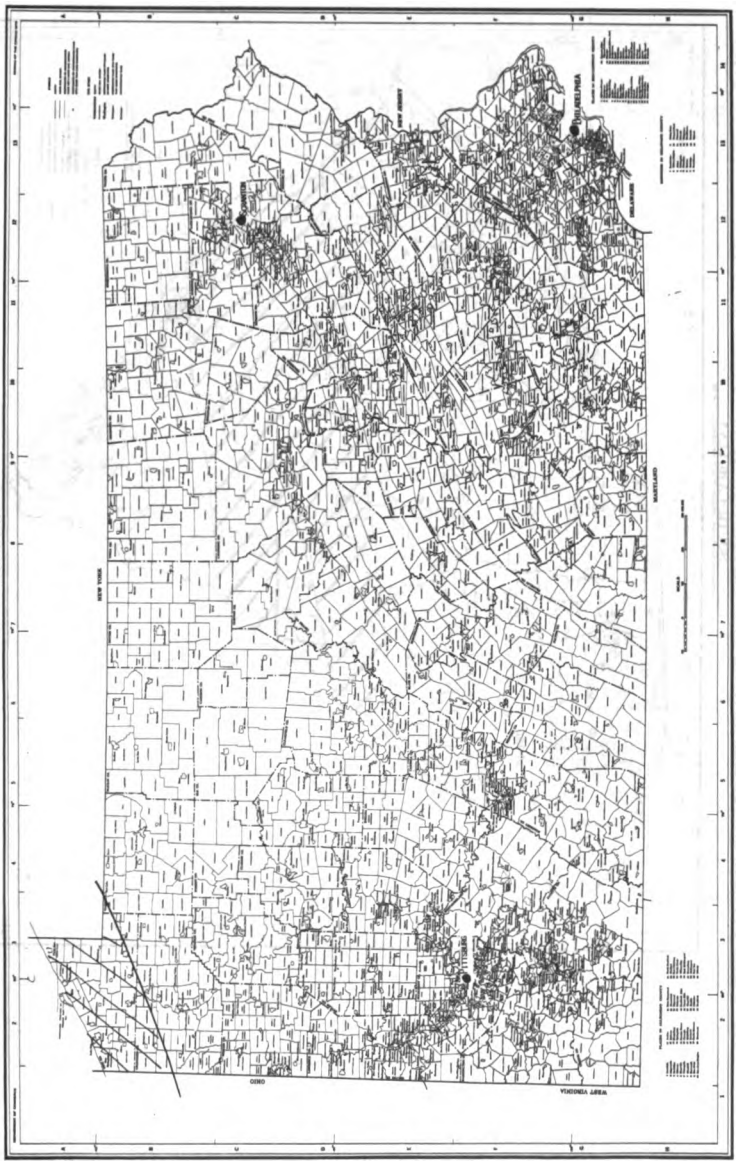

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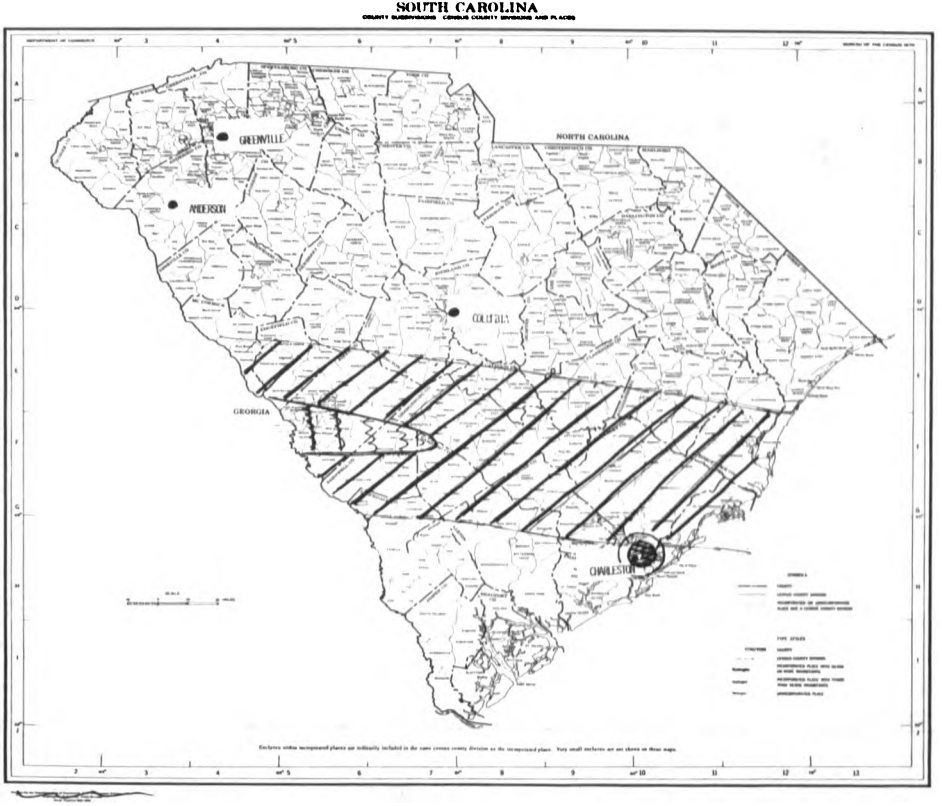

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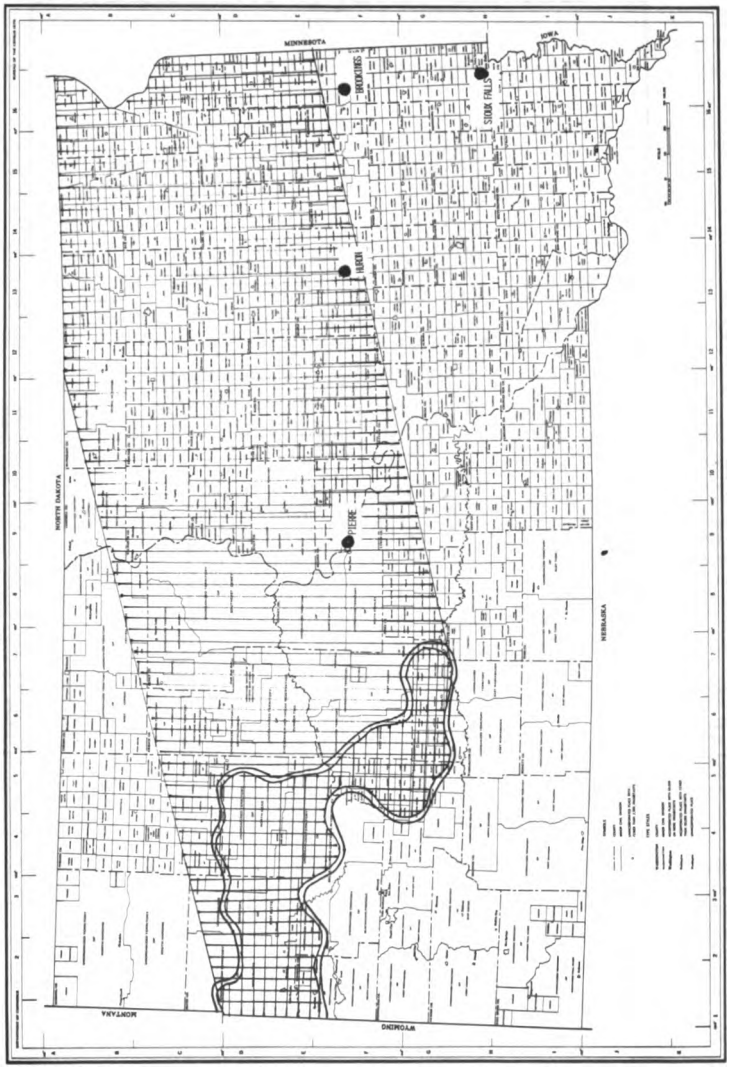

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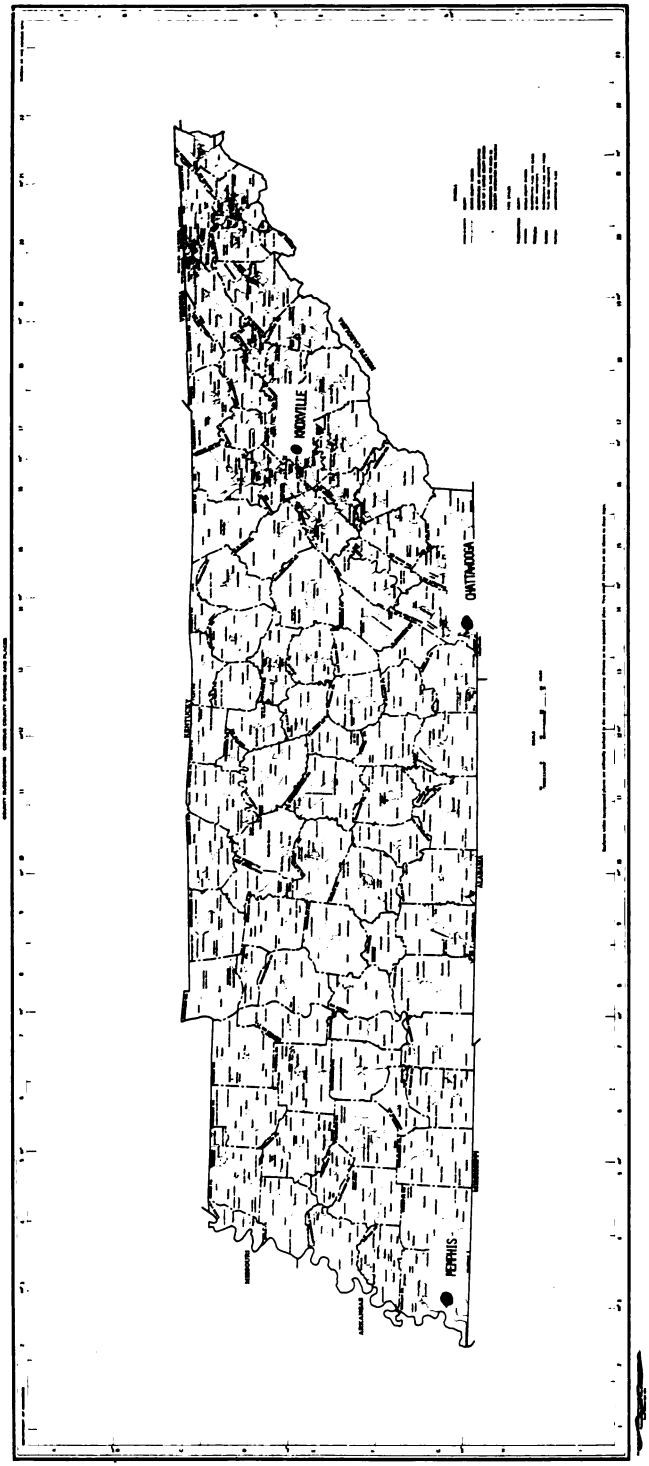
MAP 43



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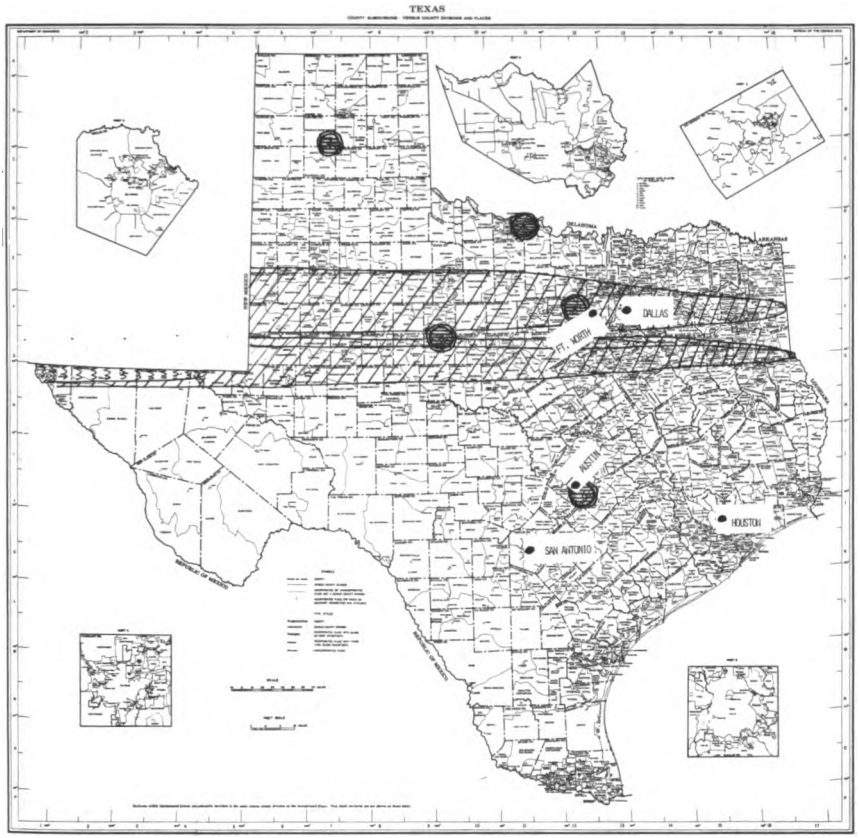

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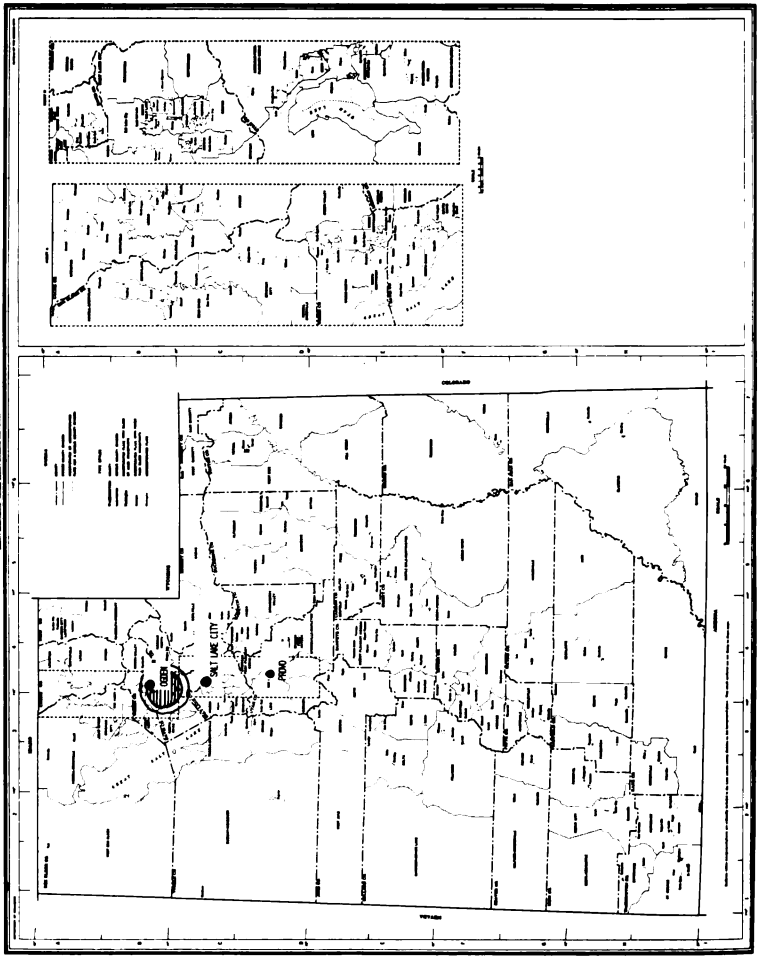

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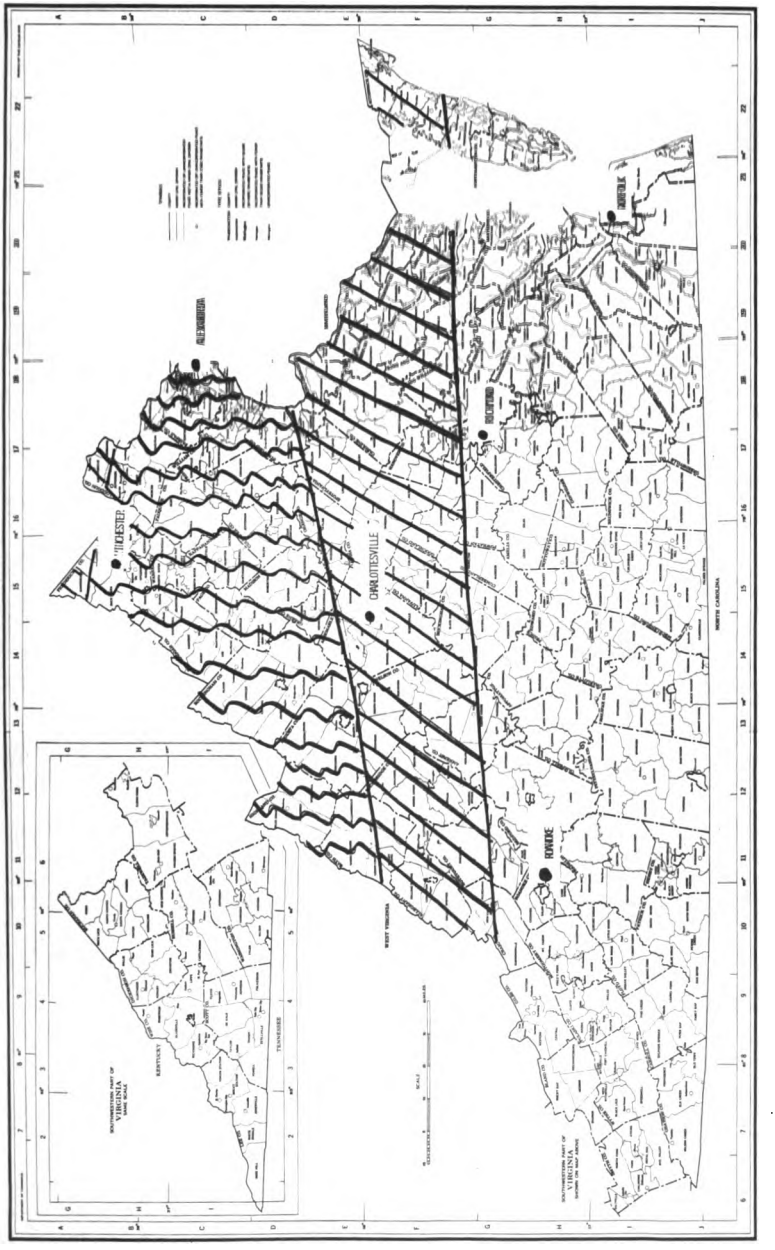

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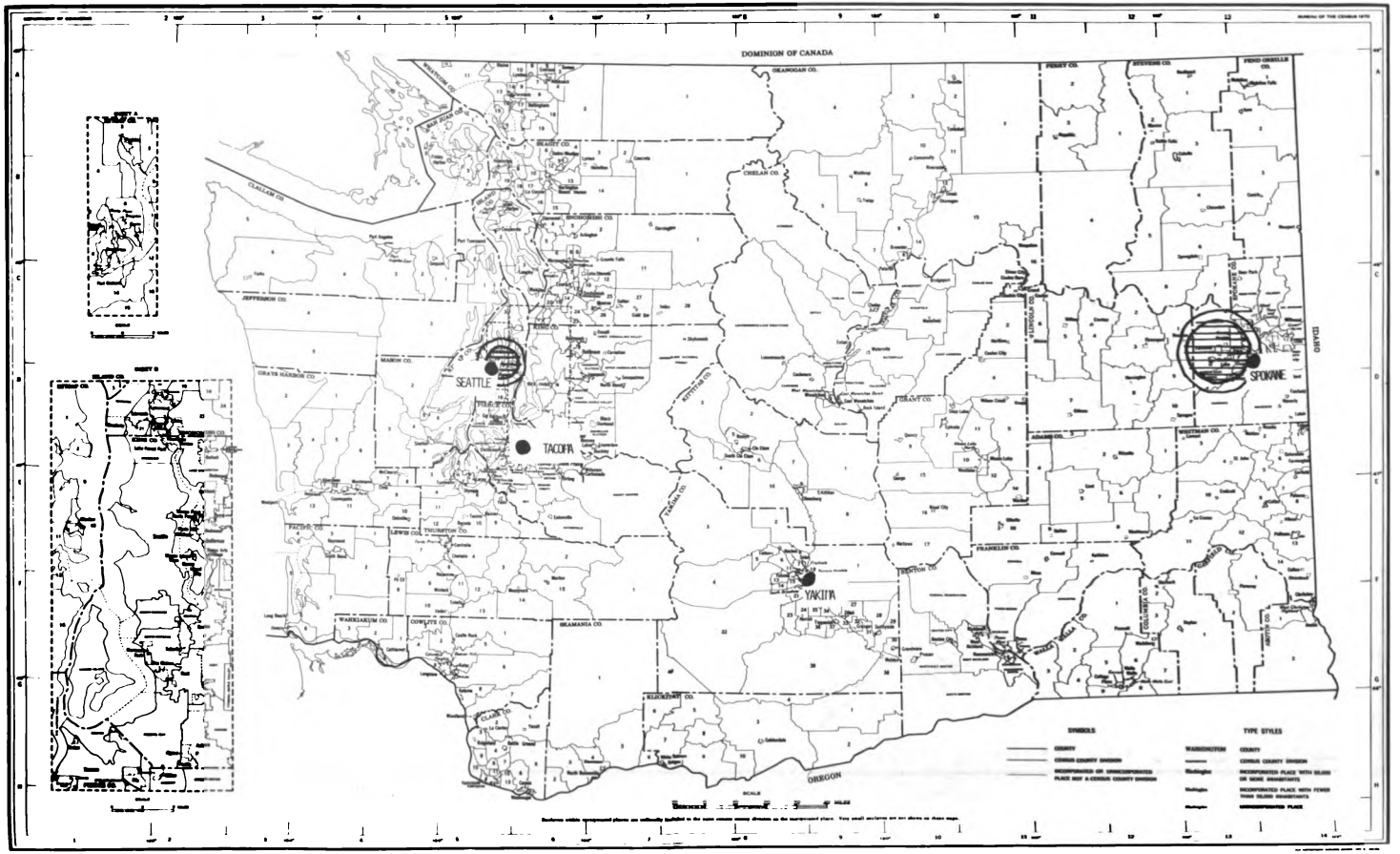

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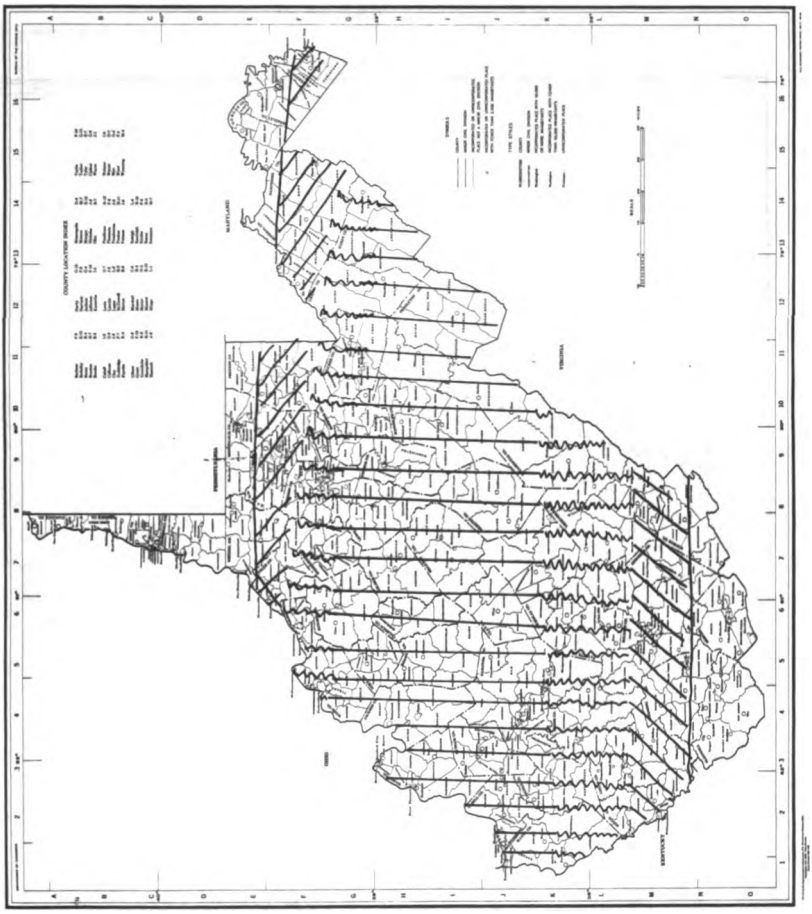

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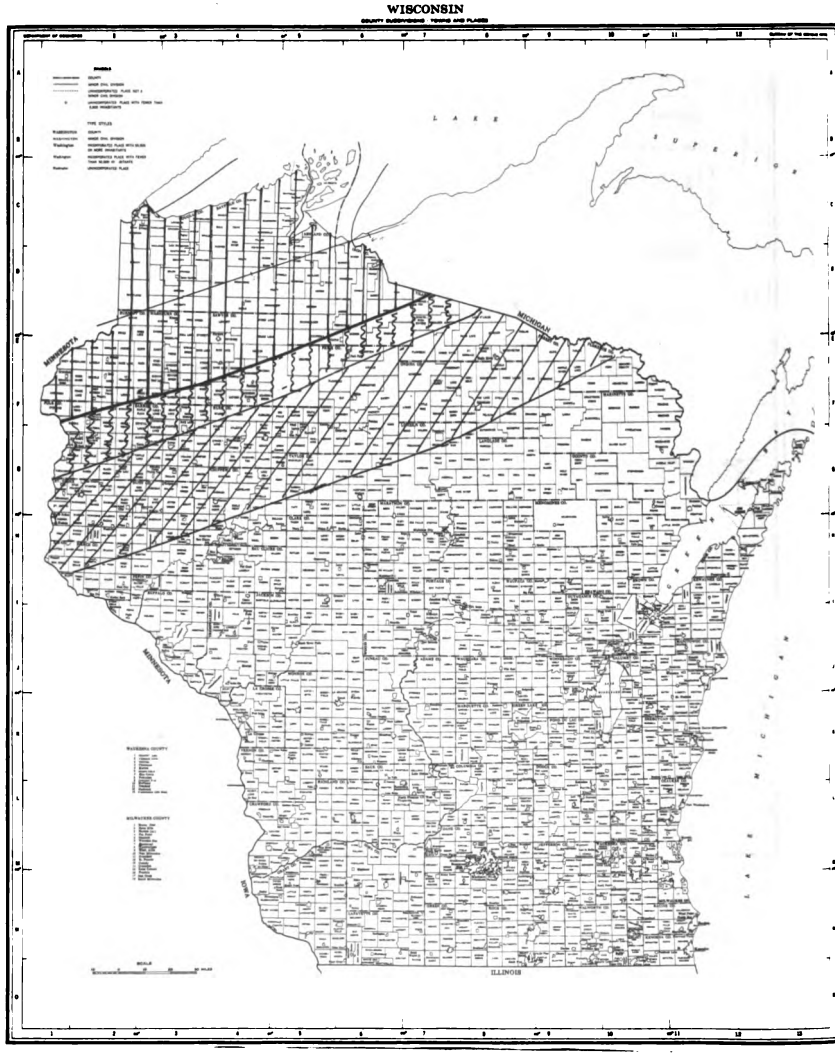

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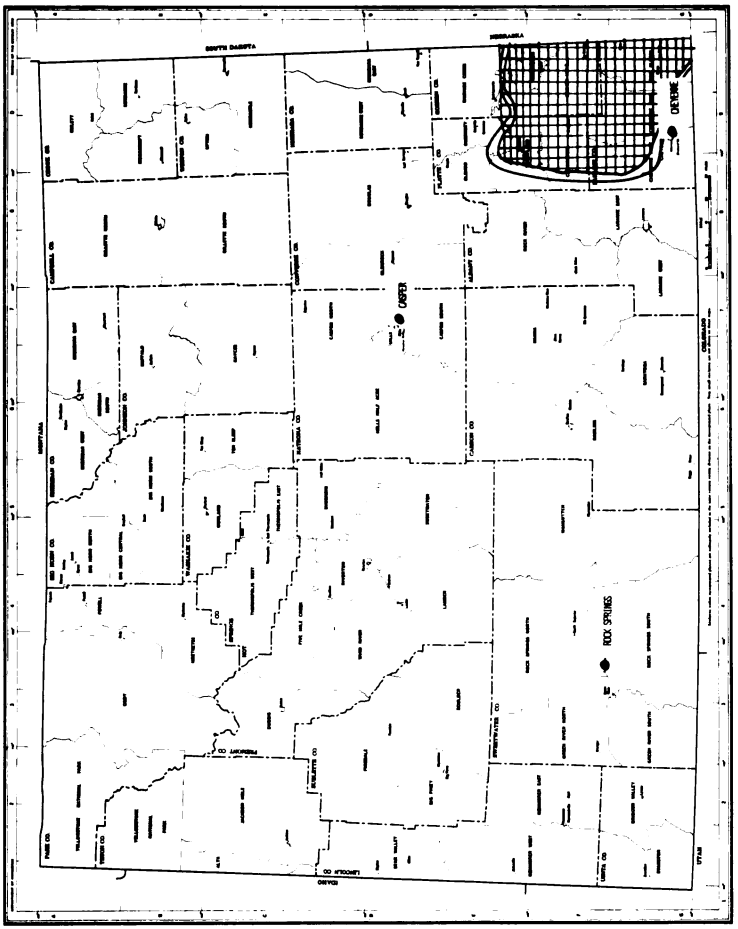

APPENDIX

BRIEFING ON COUNTERFORCE ATTACKS

WEDNESDAY, SEPTEMBER 11, 1974

UNITED STATES SENATE,
SUBCOMMITTEE ON ARMS CONTROL,
INTERNATIONAL LAW AND ORGANIZATION
OF THE COMMITTEE ON FOREIGN RELATIONS,
Washington, D.C.

The subcommittee met, pursuant to notice, at 2:30 p.m., in room S-116, the Capitol Building, Senator Edmund S. Muskie [chairman of the subcommittee] presiding.

Present: Senators Muskie, Mansfield, Symington, Pell, Case, Javits, and Pearson.

Also present: Lt. Gen. John H. Elder, USA, OJCS; Capt. James E. Kneale, USN, OASD (LA); Edward C. Aldridge, Jr., OSD; Terrence J. King, OSD; Dr. James Wade, OSD; Lt. Col. Howard Graves, OSD; and T. Sgt. A. Kautz, OJCS.

Senator MUSKIE. Do you have a prepared statement?

Secretary SCHLESINGER. No, sir.

Senator MUSKIE. Do you have Senator Case's letter?

Secretary SCHLESINGER. Yes, sir.

[The letter referred to follows:]

U.S. SENATE,
Washington, D.C., July 25, 1974.

Hon. JAMES R. SCHLESINGER,
Secretary of Defense,
The Pentagon,
Washington, D.C.

DEAR MR. SECRETARY: On July 2, I wrote to ask you for a briefing on your estimates of the total casualties and destruction expected to result from so-called nuclear "counterforce" attacks against military installations in the United States.

In asking for this information, I specifically noted that I wished these estimates to encompass the full range of consequences to the United States population and society. As a partial listing of these effects, I cited casualties to civilian as well as military personnel from blast, fallout, fire; and I included by way of example some of the longer-term consequences of these attacks, such as damage to food supplies and contamination of land and water.

My object in asking for this information is to examine the apparent assumption that enemy attacks upon U.S. military installations would, in the words of your Defense Report this year, result in "relatively few civilian casualties." In other words, I would like to know what is meant by this term "relatively few" casualties, and I am also interested in your assessment of the likely kinds of attacks that would produce these results. Beyond this, I think we also have to get down to specifics on the consequences of the wide ranges of possible "anti-military" attacks against the U.S., and that is why I would like to have the kinds of information suggested later in this letter.

While it is generally known that all-out nuclear exchanges between the United States and the Soviet Union would result in the destruction of our societies as we

know them, I do not think there has been any comparable public discussion of the human costs of the limited nuclear exchanges you have postulated.

As you know, some authorities have suggested that the resultant deaths and destruction would be so substantial as to bar this form of war in the same way that fear of all-out retaliation has until now barred all-out attack by either side.

Without prejudging the facts that I have asked for, it is clear to me that this publicly unexamined subject of the destruction we would experience from attacks targeted against military installations bears crucially upon "anti-military" exchanges as a practical alternative, as you consider it to be, to all-out nuclear war.

Should it turn out that the destruction to our society would be so substantial as to make this cost as unacceptable as all-out attacks specifically targeted against our population centers, then the rationale for the multi-billion dollar family of weapons designed to destroy military targets that has begun to be funded this year—as well as the basis for the severely stepped-up arms race so many fear—could be called into serious question. In the latter event, we might be better advised to continue to rely upon the former basis of our strategic policy—that is, mutual assured destruction—and abjure preparations for a kind of nuclear war that we would find ourselves unwilling to fight.

If we go beyond what we already have and acquire a major capability to retaliate against a wide range of attacks, it seems to me that the reduced expectancy of and risk of retaliation to all-out catastrophe might have the effect of *inviting* an enemy to consider the possibility of nuclear exchanges as a more viable course of action than at present. So far as our ability to retaliate in a selective manner against very small attacks, I suggest that we already have the necessary capability.

Mutual assured destruction, while an undesirable alternative to mutual disarmament, has been the rock upon which we have built our security. I am not inclined to risk tampering with this concept that has kept the nuclear peace without the fullest possible public debate of *all* the consequences of the limited nuclear war you seem to have postulated.

My purpose in making these views explicit is not to discuss at this time all the aspects of this extremely complex matter. Rather, I wish to give you some understanding of the basis of my request of July 2.

I believe this further explanation is necessary because the actions of your staff to date have not been responsive to my original request.

Most recently, I felt it necessary to cancel the briefing scheduled for me for July 23 because it became apparent that there has been a fundamental misunderstanding by your representatives of the substances of my request.

Specifically, I was told that the "anti-military" attacks you would consider likely would be so small in scope as to make their effects largely localized and thus would not be susceptible to analysis in their larger societal consequences. This briefing, I was informed, would thus be largely limited to estimates of destruction caused by fallout and blast.

It occurs to me—and this I meant to be implicit in my July 2 letter—that "anti-military" exchanges, once begun, even if ultimately terminated short of all-out war, could escalate to include a sizeable number of military targets on either side.

In view of the apparent misunderstanding, I would like this briefing on the total consequences to the U. S. population of attacks against military installations in the United States, to cover the full range of possible attacks, up to and including strikes against all of our Minuteman sites, all bomber bases, and all major elements of our command and control system. I assume that the Defense Department, for the purpose of these analyses, has determined representative levels of U. S. targets that could be struck. If not, I would like to have your estimates of these damages at increments of 100 Minuteman missiles targeted and at increments of five in the number of our operational SAC bomber bases; major command and control installations, as well as other military targets such as Polaris submarine bases, could be included in such combinations as you consider realistic.

I would appreciate hearing from you at your earliest convenience.

Sincerely,

CLIFFORD P. CASE,
U.S. Senator.

IDENTIFICATION OF PERSONS ACCOMPANYING SECRETARY SCHLESINGER

Senator MUSKIE. I wonder if you would ask your people to identify themselves for the reporter.

General ELDER. General Elder, from the Joint Staff, Director of Plans and Policy.

Mr. ALDRIDGE. Mr. Aldridge, from the Office of the Secretary of Defense.

Mr. KING. Mr. King, from the Office of the Secretary of Defense.

Dr. WADE. Dr. Wade, Office of Secretary of Defense.

Colonel GRAVES. Lieutenant Colonel Graves, from the Office of the Secretary of Defense and Sergeant Kautz, from the Office of Joint Chiefs of Staff.

OPENING STATEMENT

Senator MUSKIE. I will then in the presence of our additional colleagues open this executive session, which was triggered by a request of Senator Case, which I think was pretty well defined in his letter of July 25 to the Secretary. He discussed his concern with me separately and so persuasively that I agreed we ought to hold this session and whatever other hearings might be indicated.

Senator Case is concerned, as are we all, about the casualties and destruction that might be expected to result from so-called nuclear counterforce attacks against military installations in the United States. That is the opening paragraph of his letter of July 25th.

Mr. Secretary, I know you are fully familiar with the letter, so without more ado why don't you respond in any way you would like.

STATEMENT OF HON. JAMES R. SCHLESINGER, SECRETARY OF DEFENSE

Secretary SCHLESINGER. Yes, sir, Mr. Chairman. I have some vugraphs here and I would like to take 20 minutes, if that pleases the members of the Committee, just to respond in a general way. I will then respond to your detailed questions and, of course, if at any time during the 20 minutes I am unclear, I would appreciate being interrupted.

CHANGE IN TARGETING DOCTRINE

Let me make some introductory remarks with regard to the change in targeting doctrine. I think, and this is relevant to Senator Case's letter, which referred to counterforce attacks, that the change in targeting doctrine is, of course, both broader and more limited than counterforce attacks.

We have no desire to develop a unilateral counterforce capability against the Soviet Union. [Deleted.] What we wish to avoid is the Soviet Union having a counterforce capability against the United States without our being able to have a comparable capability. I continue to be hopeful that the SALT [Strategic Arms Limitation Talks] talks will permit both sides to restrain themselves.

The selective response options reflect the desire for flexibility that has existed and I will give some immediate observations with regard to that.

NEED FOR FLEXIBILITY

Would you give me slide 1, please?
[Slide 1 follows:]

SLIDE 1

[Supplied by Department of Defense]

A VIEW OF THE NEED FOR FLEXIBILITY

Senate Preparedness Investigating Subcommittee Report, September 1968:
"—Unlikely, but possible, is a limited and controlled Soviet attack on our nuclear offensive force and other military targets which avoids our cities."
"We feel that it is necessary for our nuclear strike forces to have the capability and flexibility to respond so that no matter how the war is initiated, we will be in a position to assure the termination of hostilities under conditions which are relatively favorable to us."

Secretary SCHLESINGER. This issue has a substantial history; it is not something that has come along in recent years. In 1968, for example, the Senate Preparedness Investigating Subcommittee issued a report and it stressed, I think quite rightly, that these kinds of contingencies are very unlikely, but they are possible. A controlled and limited Soviet attack on our nuclear offensive forces and other military attacks which avoid cities are, of course, what Senator Case's letter dealt with.

The Senate Preparedness Investigating Subcommittee went on to say that our forces should have the capability and the flexibility to respond so that no matter how the war is initiated we will be in a position to assure the termination of hostilities under conditions which are relatively favorable to the United States. I would add to that—hopefully, to terminate the hostilities at the lowest possible level of violence.

That was a report by a Subcommittee of the Senate Armed Services Committee in 1968, and with the approval of the chairman, I would like to place in the record at this point some pertinent extracts from that Senate report.

[The information referred to follows:]

EXCERPTS FROM THE REPORT BY THE PREPARDNESS INVESTIGATING SUBCOMMITTEE OF THE SENATE ARMED SERVICES COMMITTEE

"STATUS OF U.S. STRATEGIC POWER"
SEPTEMBER 27, 1968

[Supplied by Department of Defense]

The projections of the effectiveness of future forces which have been presented to us have a basic fault in that they assume that we will have achieved dramatically increased accuracies with MIRVed warheads while the Soviets have made no such advances. This is a shaky assumption on which to base our long-range planning. Our military and civilian planners have reasonable confidence that we will be able to MIRV our reentry vehicles and achieve the design accuracies which have been laid down. However, if this is within our technological capability and our resources, then prudence surely dictates that we assume that it is also within the technological capability and resources of the Soviets. In addition, we must recognize that the greater throw weight which many of their missiles possess gives them greater flexibility to proceed with such warhead improvements as MIRVing, hardening, and adding penetration aids.

By whatever yardstick nuclear superiority is measured, we no longer enjoy the unambiguous advantage we once maintained over the U.S.S.R., and it is generally conceded that the margin has been steadily shrinking; that we are at

least approaching parity; and that the trend is continuing. Any number of possible Soviet developments and advances would further unsettle the already precarious balance of power . . .

It is hard to conceive of any circumstances under which the United States would launch a first or preemptive strike against any actual or potential rational enemy. As a matter of fact, it would appear that neither side presently has a rational first strike option. Neither could destroy enough of the strategic nuclear forces of the other to preclude the retaliatory destruction of his own urban-industrial resources and society.

The most commonly assumed scenario for the commencement of any nuclear war is an all-out exchange of nuclear weapons with enormous damage being inflicted on the United States by the initial strike and similar devastation on the Soviet homeland by our retaliatory strike.

Unlikely, but possible, is a limited and controlled Soviet attack on our nuclear offensive force and other military targets which avoids our cities. Under such a scenario, offensive damage-limiting forces might permit a response in kind. This would require retention of hard target killers in our inventory; otherwise, with no U.S. option except to retaliate against the Soviet urban-industrial complexes, an all-out exchange could not be avoided.

We feel that it is necessary for our nuclear strike forces to have the capability and flexibility to respond so that no matter how the war is initiated we will be in a position to assure the termination of hostilities under conditions which are relatively favorable to us. This is why we believe that we must have a mixed and balanced force of land- and sea-based ballistic missiles and long-range manned bombers. In addition to Poseidon, which has already been approved, we feel that the prompt development and deployment of a new long-range advanced manned strategic bomber is essential to assure that we retain this flexibility into the late 1970's and 1980's when the aging B–52's and interim FB–111's may be incapable of coping with the sophisticated defense environment which is expected during that time period. Furthermore, research and development must be accelerated to keep open the option for deploying an advanced ICBM with sufficient throw weight to give it a real hard target kill capability, as well as the capability to penetrate enemy defenses.

Should either the Soviets or the United States attain a true first strike capability, it would have a destabilizing effect. We are not seeking to obtain such a capability and cannot attain it with presently approved forces. However, the continued buildup of Soviet forces and their emphasis on both offensive and defensive weapons suggests that they may be striving for a first strike capability. Within the limits of the resources that we are willing and able to commit for the purpose, we must select, develop, and deploy offensive and defensive weapons which will guard against this possibility.

Our forces are designed primarily for deterrence. However, it is conceivable that deterrence might fail for a number of reasons . . . . It is necessary, therefore, that our future nuclear forces be sufficient in size and capability not only to deter a deliberate enemy decision to attack but, should deterrence fail, to insure that the United States and its allies emerge with relative advantage, irrespective of the circumstances of initiation, response, and termination.

Senator CASE. Who was chairman?

Secretary SCHLESINGER. Senator Stennis was, I think, was he not, Senator Symington?

Senator SYMINGTON. Yes.

BASIS FOR FLEXIBILITY

Secretary SCHLESINGER. Will you give me slide 2, please?

[The information referred to follows:]

SLIDE 2

[Supplied by Department of Defense]

THE BASIS FOR FLEXIBILITY

The President's foreign policy message, February 18, 1970:

"Should a President, in the event of a nuclear attack, be left with the single

option of ordering the mass destruction of enemy civilians, in the face of the certainty that it would be followed by the mass slaughter of Americans?"

Secretary SCHLESINGER. Here is an excerpt from President Nixon's 1970 Foreign Policy Report which I think reflects the continuing views of Dr. Kissinger. The point is made that a President of the United States, in the kinds of circumstances hypothesized, should not be in a position in which he would have to respond massively against Soviet cities in the event of a more limited nuclear strike against the United States. Later the President said we must insure that we have the forces and procedures that provide us with alternatives appropriate to the nature and level of the provocation, namely plans and command and control capabilities necessary for selective response.

Senator CASE. This is talking about a nuclear exchange?

Secretary SCHLESINGER. Yes, sir.

Senator CASE. That word does not appear in the statement.

Secretary SCHLESINGER. Yes, it does. It was a discussion of the possibility of a Soviet strike against our nuclear facilities in the United States.

Now that theme was mentioned again in 1971—slide 3, please.

[The information referred to follows:]

SLIDE 3

[Supplied by Department of Defense]

THE BASIS FOR FLEXIBILITY

The President's foreign policy message, February 25, 1971:

"I must not be—and my successors must not be—limited to the indiscriminate mass destruction of enemy civilians as the sole possible response to challenges."

"It would be inconsistent with the political meaning of sufficiency to base our force planning solely on some finite—and theoretical—capacity to inflict casualties presumed to be unacceptable to the other side."

"We must insure that we have the forces and procedures that provide us with alternatives appropriate to the nature and level of the provocation. This means having the plans and command and control capabilities necessary to enable us to select and carry out the appropriate response without necessarily having to resort to mass destruction."

Secretary SCHLESINGER. This is a continuing theme that has come through in all of the Foreign Policy Reports of the President.

Would you give me slide 4 please?

[The information referred to follows:]

SLIDE 4

[Supplied by Department of Defense]

NATIONAL POLICY—THE BASIS FOR FLEXIBILITY

The President's foreign policy message, May 3, 1973:

"No President should ever be in a position where his only option in meeting limited nuclear aggression is all-out nuclear response."

"Potential aggressors must be aware that the United States will continue to have both the resolve and the capacity to act in the face of aggression in all circumstances."

"Credible deterrence in the 1970's requires greater flexibility."

Secretary SCHLESINGER. This is the latest foreign policy report of the President, and once again he reiterates the theme that a President should not be in a position in which his only option in response to

nuclear attack is a massive strike, including a strike against the urban industrial base of the Soviet Union.

So I would emphasize, Senator Case, that what we are trying to do here is to achieve flexibility and that flexibility is broader than counterforce strikes.

COUNTERFORCE ISSUE

Your letter dealt with the question of counterforce strikes and I will discuss the counterforce issue. What we are trying to do is to place ourselves in a position where we are able to respond to every level of attack, not necessarily by going into a major counterforce strike.

Senator SYMINGTON. Would you put that chart back on that you had?

Secretary SCHLESINGER. No. 4.

Senator SYMINGTON. Could I ask why that is classified secret?

Secretary SCHLESINGER. I have not the slightest idea. Why is it classified secret?

Mr. KING. It was supposed to be unclassified, but when they made the vu-graphs, someone inadvertently marked it secret.

Secretary SCHLESINGER. This is out of the 1973 Foreign Policy Report. It is an unclassified chart.

Senator SYMINGTON. I thought you would be as amused as I was.

Secretary SCHLESINGER. Amazed. I did not realize that we had raised the level of classification.

Let me make two or three other observations.

PURPOSE OF CHANGING TARGETING DOCTRINE

First, the purpose of our changing our targeting doctrine has been to enhance deterrence. We are dealing with very low probability events, in my judgment, and in the judgment of other people. By enhancing deterrence we reduce further the already low probability of others being tempted to take actions which are devastating to the major interests of the United States, including an attack on American soil of the sort that has been hypothesized.

CHANGE IN TARGETING DOCTRINE'S ROLE IN DETERRENCE

The question of the role that this change in targeting doctrine plays in deterrence is associated with the question that frequently arises—will this change in doctrine lower the nuclear threshold?

I would submit that it would not. In my judgment, the way to keep the nuclear threshold high is by the maintenance of a stalwart conventional defense establishment. Lowering the level of our general purpose forces is what reduces the nuclear threshold. It drives us to early recourse, either through threat or actual employment of nuclear weapons, be they tactical or strategic. In order to hold up that threshold, in our judgment, we must have ample conventional capability.

MANY YEARS OF CAREFUL STUDY

Finally, I should emphasize that we have studied these matters for many years, but the reason that we carefully study these matters is so that we can avoid circumstances in which nuclear weapons would be

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employed. Careful study leads, in our judgment, to the avoidance of the kinds of unanticipated crises or situations that could, through miscalculation, bring us to nuclear war.

With those observations I am prepared to go into the specific responses to the questions that have been raised by Senator Case.

Senator CASE. May I?

Senator MUSKIE. Of course.

MEANING OF TERM "COUNTERFORCE ATTACKS"

Senator CASE. Mr. Secretary, may I make one point? When I used the term counterforce strategy in my inquiry, I meant by that, and I think the context of our correspondence will show this, any kind of an exchange not directed at massive destruction of populations. That is what I meant by the use of that phrase, although it was perhaps loosely used.

Secretary SCHLESINGER. I think it was quite aptly used. I wanted to be sure that the full range of what we have——

Senator CASE. It meant any attack short of massive retaliation against populations.

ESSENTIAL ELEMENTS OF DETERRENCE

Secretary SCHLESINGER. Now, can I have slide 5, please?

[The information referred to follows:]

SLIDE 5

[Supplied by Department of Defense]

ESSENTIAL ELEMENTS OF DETERRENCE

DETERRENCE OF ALL LEVELS AND TYPES OF ATTACKS

No perceived asymmetries in levels or capabilities of forces—conventional or nuclear. (Designated "essential equivalence".)

An ability to clearly indicate our intentions, capabilities, and resolve to an opposing country or countries.

An ability, if a conflict occurs, to terminate the conflict at the lowest possible level consistent with U.S. objectives.

Secretary SCHLESINGER. These are the essential elements of deterrence. As I have mentioned before, what we are attempting to do is to deter attack against the United States, and against major security interests of the United States overseas, of which NATO is perhaps the most striking example.

Deterrence, in our judgment, has certain characteristics: one, the opponent should see no vulnerabilities or asymmetries in the force balance between the two sides that he can exploit; two, we should have the ability to clearly indicate the strength of our resolve and, three, as I mentioned earlier, if for some reason deterrence should fail, we should have the ability to terminate that conflict at the lowest possible level of violence. The last is, of course, the issue that Senator Case raises—whether the kinds of counter-military attacks that have been hypothesized really constitute a level of violence significantly different from large scale attacks involving both military and urban industrial targets.

DETERRENCE OF LIMITED NUCLEAR ATTACKS

Let me have slide 6.

[The information referred to follows:]

SLIDE 6

[Supplied by Department of Defense]

DETERRENCE OF LIMITED NUCLEAR ATTACKS

WE CANNOT CONTROL SOVIET INTENTIONS OR ACTIONS BUT WE CAN BE PREPARED TO RESPOND TO SOVIET CAPABILITIES

Soviet limited attack capability—U.S. ability to respond in kind:

Denies the Soviet Union the prospect that the United States could be self-deterred—that is, no response in the face of the holocaust resulting from a massive, SIOP-level response.

If the Soviet Union does launch an attack, it is faced with the prospect of no net gain and would have no incentive to continue.

Secretary SCHLESINGER. Senator Case's letter goes into the effects of a limited Soviet nuclear attack against the United States. I shall give you some calculations in just a minute or so.

The point that has been made by us now, which, of course, was made by the Senate Preparedness Investigating Subcommittee, is that the ability of the United States to respond to such an attack contributes to the deterrence of such an attack. If our only option were to be able to launch massive strikes against the Soviet urban industrial base, the Soviets in these hypothetical circumstances—and I continue to stress that they are hypothetical—might believe that the United States would be self-deterred and that, therefore, they could with relatively low risk selectively attack the interior of the United States.

If the United States possesses the ability to respond in kind, then the Soviet planner is faced with the prospect that the United States would respond and leave him in a no gain situation and, therefore, he would continue to be deterred. Deterrence remains the name of the game.

Slide 7, please.

[The information referred to is classified and in the committee files.]

Senator PEARSON. In your first hypothetical did you say strike the interior of the United States or strike selective missile bases?

Secretary SCHLESINGER. Either one. A strike at missile bases in the United States would be a strike at the interior of the United States.

Senator PEARSON. But you are talking about missile bases?

Secretary SCHLESINGER. We shall deal with command control facilities, SAC [Strategic Air Command] bases, missile sites, and submarine bases along the lines that Senator Case outlined in his letter.

IMPROVEMENT OF SOVIET CAPABILITIES

As you know, the Soviets will be improving their capabilities. We would hope through SALT negotiations to control the rate of build-up of Soviet warheads that would have counterforce capabilities.

At the present time the Soviets have a couple of thousand warheads. As you look out beyond 1975 they probably will start a process of deployment of MIRVed missiles which we would expect to number

about 200 ICBM's [Intercontinental Ballistic Missile] a year if they conform to previous trends. These deployments will involve some of the collection of new missiles that I discussed with you previously. So, roughly 7 or 8 years from now they could have on the order of 7,000 MIRVed [Multiple Independently Targetable Reentry Vehicle] reentry bodies deployed.

It is this growth of Soviet capability that makes physically possible the kinds of strikes that Senator Case hypothesized in his letter.

There will be an improvement—slide 8, please—in Soviet CEP's. [Circular Error Probability.]

[The information referred to is classified and in the committee files.]

[The following information was subsequently supplied:]

ACCURACY OF SOVIET ICBM's

[Supplied by Department of Defense]

We have some information that the Soviets have achieved or will soon achieve, accuracies of 500 to 700 meters with their ICBMs. These figures may be a little optimistic, but that would represent about a fourth to a third of a nautical mile.

Secretary SCHLESINGER. [Deleted.] Increasingly as we go out over the course of the next decade they can achieve CEP's on the order of a [deleted] of a nautical mile or better.

So, the number of RV's [Reentry Vehicle] that they will have will increase and they will acquire greater accuracy.

U.S. TARGET SYSTEM

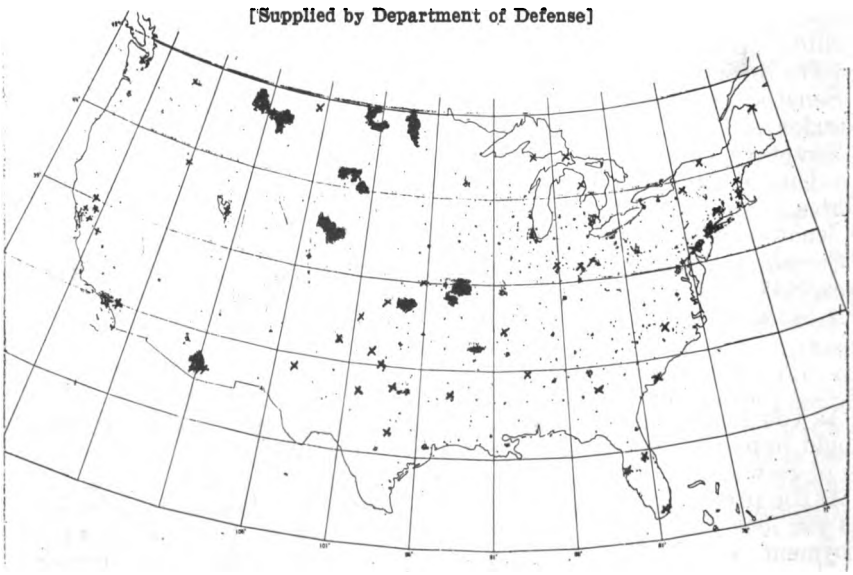
Slide 9, please.

[The information referred to follows:]

SLIDE 9

U.S. TARGET SYSTEM

[Supplied by Department of Defense]



●=concentrations of urban population.
x=SAC bomber bases and missile submarine support bases.
Large shaded areas=deployment of Minuteman and Titan II.

Secretary SCHLESINGER. These are the strategic nuclear forces targets systems for Soviet nuclear strikes against the United States. Of course, if one were to hypothesize about selective strikes, it could be a more limited array of targets, Senator Case. But this is the full set of strategic nuclear forces targets in the United States.

The black dots represent the concentrations of urban population and the U.S. strategic nuclear forces targets are represented as follows: The large shaded areas show the deployment of Minuteman and Titan II, and the X marks represent the 46 SAC bomber bases and the two CONUS [Continental United States] SLBM [Submarine Launched Ballistic Missile] bases which I will refer to later on.

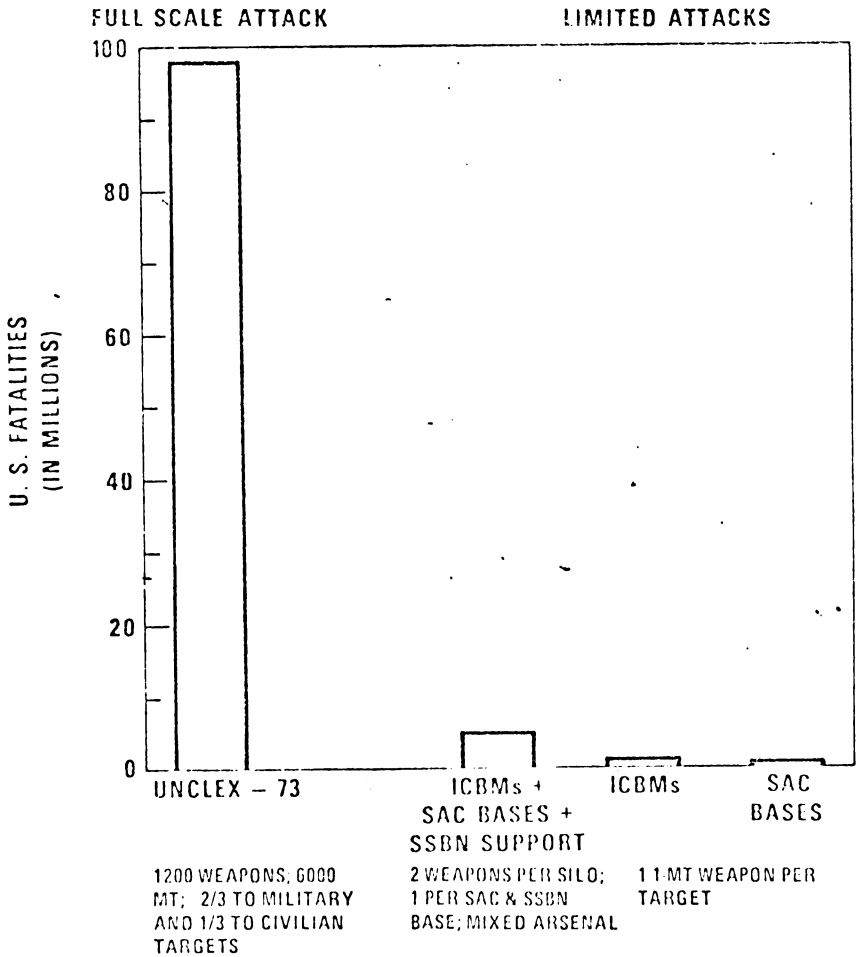
Slide 10, please.

[The information referred to follows:]

SLIDE 10

[Supplied by Department of Defense]

COMPARISON OF FULL SCALE AND LIMITED NUCLEAR ATTACKS AGAINST THE UNITED STATES



Secretary SCHLESINGER. The main point that one gets from the previous slide is the nonlocation, by and large, of the strategic nuclear forces targets located in the United States and the urban population of the United States.

As Senator Symington has pointed out to me on another occasion, Whiteman Air Force Base in Missouri is located quite close to the city of St. Louis.

Senator PEARSON. Kansas City.

Secretary SCHLESINGER. And that is one of the most prominent cases involving a relatively close co-location of strategic targets and a major urban population center, considering normal U.S. wind patterns and their effect on the distribution of radioactive debris.

COMPARATIVE FATALITIES FROM MASSIVE AND SELECTIVE STRIKES

Senator Case, here we have a rough comparison of the number of fatalities that would be imposed on the American public by a massive strike of the sort that we have contemplated historically in the SIOP, [Single Integrated Operation Plan], a strike which would give us prompt plus fallout fatalities on the order of 95–100 million, and the number of fatalities which would be associated with the selective strikes shown on the slide.

In the first example of a selective counterforce strike by the Soviet Union—in which they attack SSBN [Nuclear Powered Ballistic Missile Submarine] bases and SAC bases, as well as the ICBM silos—the mortalities could be as high as, say 5 or 6 million. In an attack on the ICBM's alone, the mortalities would run on the order of a million; and for SAC bases, the mortalities would be less than that—on the order of 500,000.

Once again, these are prompt plus fallout fatalities. Also, please note that this hypothetical attack includes two reentry vehicles per silo and a mixed Soviet arsenal containing various weapon yields.

CASUALTIES FROM SOVIET ATTACKS ON U.S. ICBM'S FIELDS

Now, slide 11, please.

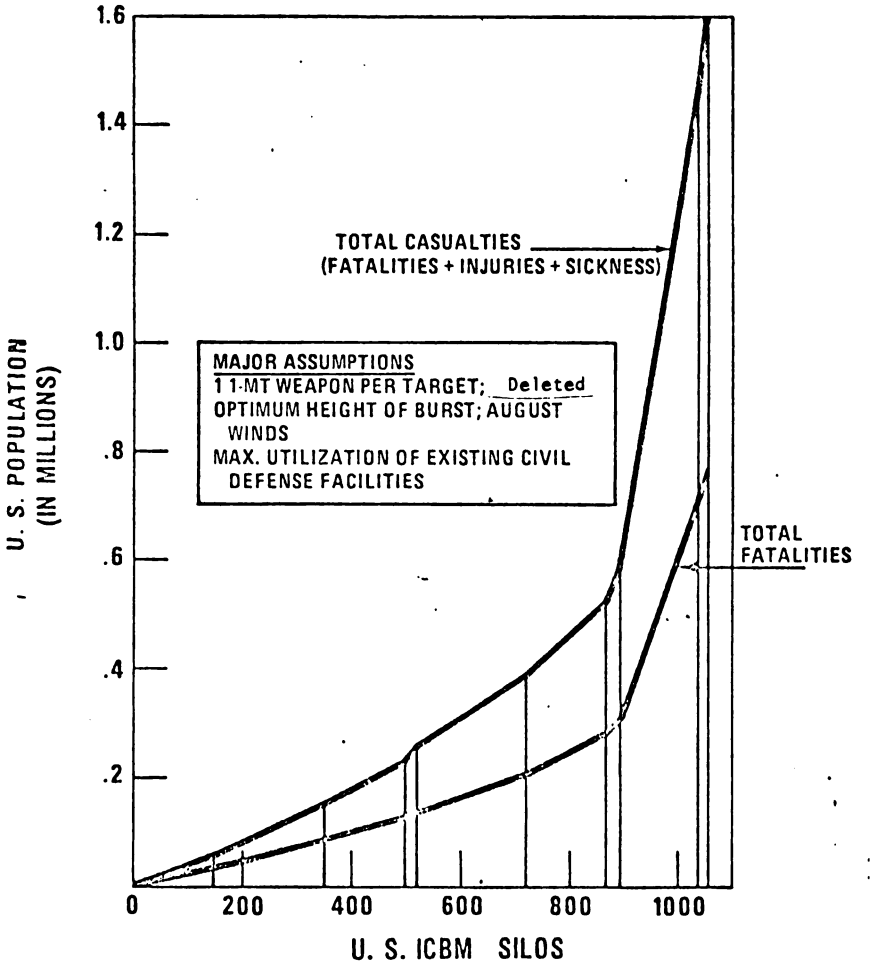
[The information referred to follows:]

12

SLIDE 11

[Supplied by Department of Defense]

COLLATERAL IMPACT ON U.S. POPULATION OF A SOVIET ATTACK ON U.S. ICBM FIELDS



Secretary SCHLESINGER. This chart pertains to a strike on the ICBM fields alone and indicates the casualties associated with a hypothetical Soviet strike involving one 1-megaton reentry vehicle per silo. For five of the six Minuteman fields, the total number of casualties would approach half a million and the total number of fatalities would be on the order of 300,000. Once again, an attack on Whiteman Air Force Base, which is shown as the 6th of the Minuteman fields, because of its westerly proximity to a major urban/rural population complex, would drive the number of fatalities up to about 800,000. The number of casualties including people who fall ill as a result of radiation sickness coming from fallout, would approach a million and a half.

Senator CASE. That is six attacks or five, the last one?

Secretary SCHLESINGER. They are shown cumulatively, Senator Case, beginning with the attacks on Minuteman fields that would cause the least collateral fatalities and casualties, up to the Minuteman field that would cause the most, and that would be Whiteman Air Force Base.

Once again, the total number of mortalities would be under a million for an attack consisting of one 1-megaton weapon per silo.

We would emphasize the fact that these are highly undesirable circumstances and that we continue to believe that such an attack will be deterred. But the number of fatalities here is a relatively small fraction, less than 1 percent, of the fatalities associated with a massive attack against the United States which includes direct attacks on our cities.

Slide 12, please.

[The information referred to is classified and in the committee files.]

This slide basically has only one purpose, to demonstrate that significant variations in most of the parameters associated with such a strike on Minuteman would result in relatively modest changes in the number of casualties or fatalities, with the major exception being whether a burst is on the surface or in the air. If the Soviets chose to surface burst their weapons rather than airburst their weapons, it would drive the number of fatalities or casualties to a significantly higher level, something on the order of 3 million.

If the Soviets were contemplating such a strike, it is assumed that they would avoid surface bursting their weapons. But, if one assumes that they did not avoid surface bursts, then, of course, the casualty levels would be much higher.

CASUALTIES FROM SOVIET ATTACK ON U.S. SAC BOMBER BASES

Slide 13, please.

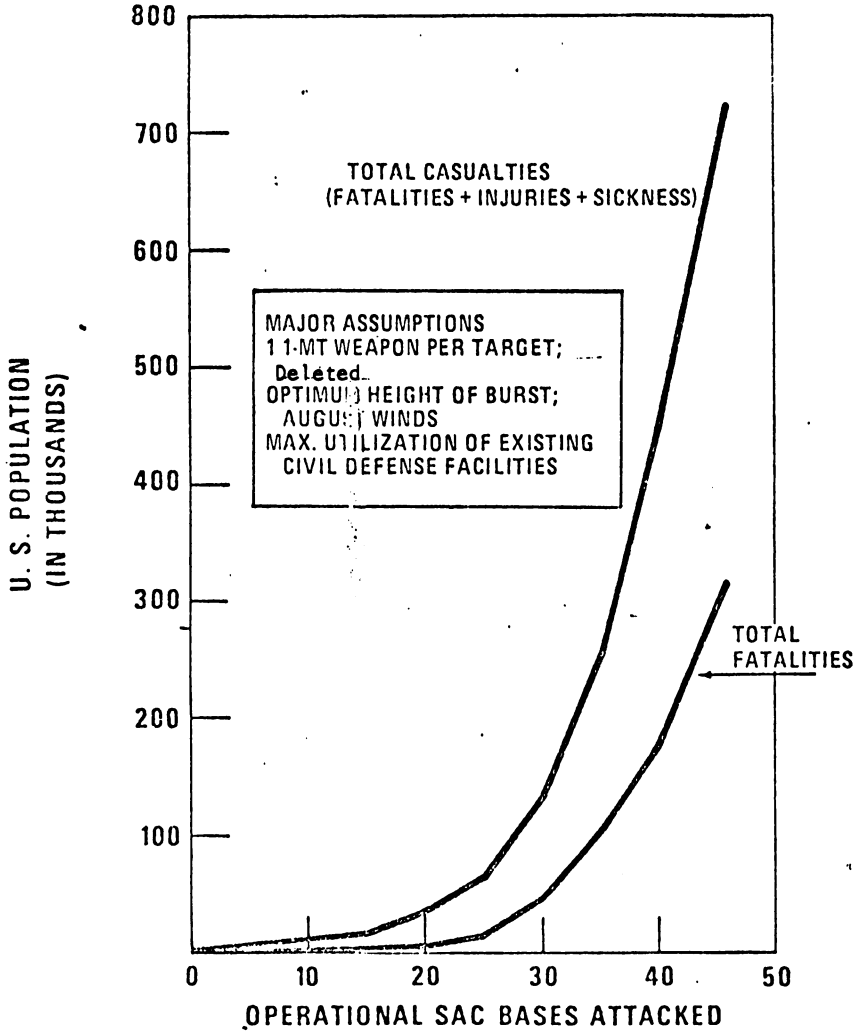
[The information referred to follows:]

14

SLIDE 18

[Supplied by Department of Defense]

COLLATERAL IMPACT ON U.S. POPULATION OF A SOVIET ATTACK ON U.S. SAC BOMBER BASES



Secretary SCHLESINGER. This chart depicts the collateral damage from an attack on SAC bomber bases only. In this case, we also assume one 1-megaton weapon per target, optimum height of burst, and and August, that is prevailing winds. We would utilize whatever civil defense facilities are available. At the present time they are fair, but you will see that attacking the roughly 45 operational SAC bomber bases would result in fatalities of around 300,000 Americans, and total casualties of around 700,000. So if that target system is attacked, once again one is talking about casualties of under a million.

Slide 14, please. I will terminate this discussion in just a minute, Mr. Chairman. I would like to run through all of these slides so that you have the rough parameters in mind.

[The information referred to is classified and in the committee files.]

Secretary SCHLESINGER. Once again, this chart demonstrates that in the case of an attack on SAC bomber bases only, most of the variables do not significantly influence the results, except if the Soviets should choose to burst their weapons on the surface, in which case the number of casualties would go up by a factor of 2 to 3.

CASUALTIES FROM SOVIET ATTACK ON OTHER SELECTED U.S. MILITARY TARGETS

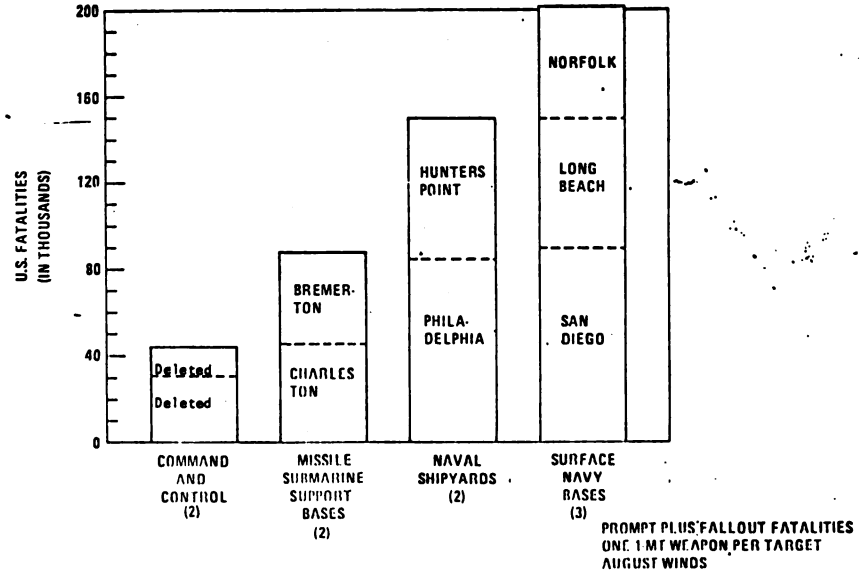
Slide 15.

[The information referred to follows:]

SLIDE 15

[Supplied by Department of Defense]

COLLATERAL IMPACT ON U.S. POPULATION RESULTING FROM A SOVIET ATTACK ON OTHER SELECTED U.S. MILITARY TARGETS



Secretary SCHLESINGER. These are the fatalities associated with strikes against command and control facilities, or strikes against fleet ballistic missile submarine support bases, or against naval shipyards, or against other naval bases. These, of course, represent individual target systems.

[Deleted.]

Attacks on those two command and control facilities would result in fatalities on the order of 40,000 to 45,000 people.

If the Soviets were to attack the CONUS—Continental United States—SSBN support bases, Charleston and Bremerton, possible fatalities could number on the order of 100,000.

I think this gives you a feel for the magnitudes involved in the event that the kinds of strikes by the Soviets which are hypothesized in the letter from Senator Case were actually to take place.

EFFECT ON ST. LOUIS OF SOVIET ATTACK ON WHITEMAN AIR FORCE BASE

Let me have slide 16.

[The information referred to follows:]

SLIDE 16

[Supplied by Department of Defense]

COLLATERAL EFFECTS UPON METROPOLITAN ST. LOUIS POPULACE (1,900,000 PEOPLE AT RISK)

Attack	Fatalities	Nonfatal injuries	Unaffected
Comprehensive military (2 weapons/ICBM silo; 1 weapon/SAC—SSBN support base):			
National average protection factor [1]	750,000	210,000	940,000
St. Louis protection factor [2]	51,000	540,000	1,309,000
Whiteman AFB (1 1-MT weapon/ICBM silo):			
National average protection factor [1]	26,000	130,000	1,744,000
St. Louis protection factor [2]	<1,000	3,000	1,896,000

[1] These are the figures actually presented to the committee during the hearing. As noted, they are derived by applying to St. Louis the National average protection factor profile for all metropolitan complexes in the United States.

[2] These are the figures which result from applying to St. Louis the specific St. Louis protection factor profile based upon the latest fallout shelter survey data reported to the Defense Civil Preparedness Agency. If the fallout shelter facilities available in the St. Louis metropolitan area are effectively utilized, the casualties resulting from the two attacks postulated in this chart would approximate these figures rather than the figures originally presented to the Committee.

Secretary SCHLESINGER. The set of numbers at the bottom of this chart represents the possible effect on St. Louis of a one 1-megaton weapon attack on each ICBM silo in the complex at Whiteman Air Force Base. This would be a counterforce attack designed to minimize collateral fatalities.

Senator SYMINGTON. As long as it is my State, if the Secretary will yield, are you talking about St. Louis in this case?

Secretary SCHLESINGER. Sir, because of the prevailing winds, St. Louis is vulnerable to fallout from an attack on Whiteman Air Force Base.

Senator SYMINGTON. But the situation would be very different if there was no prevailing wind.

Secretary SCHLESINGER. That is right.

Senator SYMINGTON. Quite a lot of time the wind is east to west. Would these casualties be the same for St. Louis if the wind was east to west?

Secretary SCHLESINGER. No, sir; this is assuming prevailing winds. We can give to you——

Mr. KING. Over a 30-day period.

Secretary SCHLESINGER. We can give to you the weather patterns that appear in different months of the year and, of course, the number of fatalities associated with such an attack depends in part upon the month of the year in which such an attack takes place. I believe that March would be one of the worst months, from our standpoint, for such an attack to take place.

KANSAS CITY AND ST. LOUIS CASUALTIES

Senator SYMINGTON. Have you the estimated casualties for Kansas City?

Secretary SCHLESINGER. Yes, sir, we can provide those for you.

Senator SYMINGTON. In case the wind went the other way.

Secretary SCHLESINGER. Yes, sir.

Senator SYMINGTON. Whiteman is so much closer to Kansas City.

Secretary SCHLESINGER. Yes, sir.

Senator SYMINGTON. Can we have those for the record?

Secretary SCHLESINGER. Yes, sir. I believe this would be a worst possible counterforce attack case in that it assumes that St. Louis would be directly down wind from the detonation of a large number of nuclear weapons.

[The following information was subsequently supplied:]

BASIS OF 750,000 FATALITIES FIGURE

[Supplied by Department of Defense]

The 750,000 fatalities figure, of course, is based on a "worst case" comprehensive counterforce attack in which no particular effort is made by the attackers to minimize collateral fatalities from fallout. It assumes, for example the use of two large, relatively "dirty" weapons against each Minuteman silo and an attack on SAC bomber bases as well.

[The information referred to follows:]

CASUALTIES IN KANSAS CITY FROM ATTACK ON MINUTEMAN SILOS AT WHITEMAN AIR FORCE BASE

[Supplied by Department of Defense]

The casualties in Kansas City from a one 1-megaton attack on each of the MINUTEMAN silos at Whiteman Air Force Base, assuming the wind is blowing in a westerly direction, would number about 216,000 fatalities and 477,000 non-fatal injuries using the national average protection factor profile, and 1,500 fatalities and 8,000 non-fatal injuries using the specific Kansas City protection factor profile. In this case, of course, St. Louis would remain relatively unaffected.

Secretary SCHLESINGER. Senator Case, I think that this covers the major points that you wanted us to respond to.

SUMMARY

Let me have slide 17. That is a summary chart.

[The information referred to follows:]

SLIDE 17

[Supplied by Department of Defense]

SUMMARY

The Soviets have a capability to conduct limited nuclear strikes on U.S. military targets. Nth country attacks will by their nature be limited in the foreseeable future.

Although the probability of nuclear war is extremely remote, a limited strike scenario—as contrasted with a full scale exchange scenario with the Soviet Union—may be the more likely way a nuclear war could start.

By: Developing pre-planned options for less than SIOP-level strikes. Investing in C^3 and retargeting flexibility to provide improved ad hoc response capability.

We can contribute to deterrence of such attacks by improving our capability to deny the hypothetical attacker his objectives.

To do otherwise would result in unacceptable alternatives in the face of such an attack—no response or holocaust.

The likelihood of limited nuclear attacks cannot be challenged on the assumption that massive civilian fatalities and injuries would result.

Senator CASE. At some point I did want to go into the question of accuracy of these estimates.

Secretary SCHLESINGER. All right.

Senator MUSKIE. I yield to you when he is finished.

Secretary SCHLESINGER. Let me finish this summary chart.

Senator CASE. Yes.

Secretary SCHLESINGER. Then we can answer these questions. The Soviets have a capability, which will increase as they deploy MIRV missiles, to conduct selective and limited strikes against the United States. To the extent that they improve their accuracies and lower their yields, of course, the fatalities associated with large yield weapons would diminish.

I regard the likelihood of a nuclear war getting started between the United States and the Soviet Union as very low. I find it difficult to conceive of the circumstances under which either side would attack the urban industrial base of the other out of the blue. It just does not make sense, unless a government has gone mad. So we would say that the likelihood of a nuclear exchange starting with a selective strike, however low, is still higher than the likelihood of such an exchange starting with a strike at the urban industrial centers of the United States.

HIGHER LIKELIHOOD OF NUCLEAR EXCHANGE STARTING WITH SELECTIVE STRIKE

Senator SYMINGTON. Could I ask you why you think that?

Secretary SCHLESINGER. Because a strike at the urban industrial centers of the United States would result in fatalities of 95 or 100 million people, possibly higher. Under those circumstances there would be no reason for the United States, in any Soviet calculation, to restrain itself from responding to such an attack in kind, thus destroying most of the urban industrial base of the Soviet Union. They themselves would lose the equivalent population of approximately 100 million people.

Senator CASE. Then we would lose the remaining 100 million?

Secretary SCHLESINGER. No, sir, I think that when one talks about this kind of strike one should recognize that it is the urban population that is the target not the small town or rural area.

Senator CASE. The enemy would exhaust its capacity the first time?

Secretary SCHLESINGER. Reasonably, you have a curve which indicates the population at risk and if they were to strike at our urban industrial base they would be moving up to the knee of the curve. I find it difficult to conceive of the circumstances under which any rational leader would consider such a strike to be to the advantage

of his nation, given all that the attacker would have at risk under those circumstances.

ANY COUNTRY'S USE OF NUCLEAR WEAPONS TODAY QUESTIONED

Senator SYMINGTON. I personally cannot conceive of any country using nuclear weapons at any level today, because if I may say so, with great respect, you talk as if the Joint Chiefs of Staff of the Soviet Union and the Joint Chiefs of Staff of the United States were together in this thing and started to play a game of chess. It would be difficult for me, especially considering the casualties that you say would come around my State, and Senator Pearson's State, to think that the United States would take a relatively low position because only 1 million people have been killed, as it would be if there was 5, 10, or 15 million people killed. I cannot quite understand the gradation.

Secretary SCHLESINGER. I agree entirely with the thrust of your remarks. Any recourse to nuclear weapons is going to be a very agonizing choice for the political leadership. I trust it will remain that way, and even grow more agonizing for them to contemplate such a recourse. The point I am making is that however unlikely one regards these kinds of selective strikes, it is even more unlikely, unless one has a mad leadership, that any nation would attack, "out of the blue," the urban industrial base of any other nation that has significant nuclear retaliatory capability.

Senator SYMINGTON. So what we are really talking about is real insanity?

Secretary SCHLESINGER. I am not sure I would employ those words. I think we are talking about relative likelihood and unlikelihood.

Senator MUSKIE. I do want to yield to Senator Case to pursue——

Senator CASE. This is all directly on the point.

POSSIBILITY OF REDUCED RESISTANCE TO USING NUCLEAR WEAPONS

Senator MUSKIE. By accepting the notion of limited nuclear involvement of this kind, don't we raise the possibility of reducing the resistance to using nuclear weapons and make it more likely?

Secretary SCHLESINGER. I do not think so, Senator.

Senator MUSKIE. Why not?

Secretary SCHLESINGER. I think the possibility has always been there, and has been recognized to be there, when one has adequate command and control facilities and an adequate supply of weapons.

POSSIBILITY OF SELECTIVE ATTACKS

I was responding, Senator Symington, to the questions that were raised by Senator Case in his letter. I was trying to give direct answers with regard to the number of mortalities that might be involved in selective attacks. I was not attempting to say that this is a very probable event that the Soviet leadership would decide on such a course, As has been the case, though, for roughly a decade, these possibilities have been hypothesized. They were hypothesized by the Department of Defense, as you will recall, when Secretary McNamara

dealt with these issues in 1962 during his address at Athens and later at Ann Arbor. The Senate Preparedness Investigating Subcommittee also has dealt with these issues.

So I am not trying to argue that these are likely events. I hope that we will keep the probabilities of their occurrence exceedingly low, Senator Symington.

The point is that we should deter nuclear attacks on the United States across the spectrum. If an opponent were to decide that we would be self-deterred because the President of the United States lacked adequate response options, and if an opponent were a risk taker, then such a selective nuclear attack becomes conceivable.

COMPARATIVE UNITED STATES-SOVIET FATALITIES

Senator PEARSON. Mr. Secretary, the urban industrial centers in the Soviet Union are fewer in number and smaller in size, are they not, than in the United States?

Secretary SCHLESINGER. I think the number is approximately the same.

Senator PEARSON. It is sort of silly to talk about numbers or arithmetic when you are dealing with 95 or 100 million people, but all of the comparisons that I have seen heretofore put the Soviets at a much lower figure.

Secretary SCHLESINGER. I think that there is——

Senator PEARSON. A few minutes ago, you set the Soviet fatalities at a higher figure than the United States.

Secretary SCHLESINGER. That was a rough approximation. I said around 100 million. I think the fatality figures are roughly comparable. There is a slightly higher vulnerability for the United States because our population is more urbanized than the Soviet population. That circumstance is to some extent offset by the fact that in the United States the concentration of populations in the urban areas themselves is lower than in comparable Soviet cities.

For example, Los Angeles has an urban population of about 6,000 per square mile, whereas Moscow has a population concentration of about 16,000 per square mile.

American cities are more spread out than Soviet cities and this tends to counteract the higher degree of urbanization. But, by and large, there is a somewhat higher relative vulnerability of the American population.

FLEXIBILITY OF CHANGING TARGETS

Senator PEARSON. Is changing targets an inflexible thing? Can you change a missile target within a relatively short period of time, or is it a fixed mechanism?

Secretary SCHLESINGER. In the past we have taken 16 to 24 hours, say, to change a target tape on a missile. One had to enter the missile in the silo to change the target tape.

Senator PEARSON. Yes.

Secretary SCHLESINGER. Now, we are installing what we call the Command Data Buffer system in all Minuteman III wings, which permits us to change target sets in the missile computer in 36 minutes remotely from the launch control center.

Senator PEARSON. Thirty-six minutes?

Secretary SCHLESINGER. Yes, sir.

Senator PEARSON. Even at 36 minutes, you do not get the flexibility of deciding whether you are going to hit industrial or urban industrial centers or whether you are going to hit missile sites?

Secretary SCHLESINGER. That permits greater flexibility with the employment of individual weapons, but the question of whether one is going against urban industrial sites or not depends upon preplanning and other elements of command and control. A major change which results from the change in targeting doctrine is that we are paying much more attention than previously to planning for the possibility of these kinds of selective strikes we have been talking about, and from which collateral damage would be low.

Senator PEARSON. Do you have any intelligence as to how the Soviets are progressing on this time factor for changing targets?

Secretary SCHLESINGER. [Deleted.]

Senator PEARSON. The way we target now, do we have flexibility in our targets on missiles so that some of them could be set for the missile sites and some for the industrial sites, urban?

Secretary SCHLESINGER. Yes, sir, you can do that with a single missile. You have a limited number of targets that can be contained in the memory of an individual missile.

TIMEFRAME BETWEEN KNOWLEDGE OF LAUNCH AND IMPACT

Senator PEARSON. To refresh my memory, what is the timeframe between knowledge of a launch against the United States and impact or reentry?

Secretary SCHLESINGER. About 30 minutes for ICBM's. Five to ten minutes, depending on the trajectory for SLBM's [Submarine Launched Ballistic Missiles] deployed close to the American shore. About 10 to 15 minutes for SLBM's from the current Soviet SSBN deployment areas.

Senator PEARSON. Thank you.

NUMBER OF MISSILES INVOLVED IN LIMITED LAUNCH

Senator MUSKIE. How many missiles would such a launch for limited purposes minimally involve?

Secretary SCHLESINGER. It could be as few as one or two missiles.

Senator CASE. You would use two missiles, would you not, Mr. Secretary, for each target?

Secretary SCHLESINGER. No, I do not think that you would need to do that. In the cases that we outlined, for example, against a soft target such as a SAC air base, we used a single reentry body; against Minuteman silos, we used as examples one and two warheads per silo.

SCENARIO JUSTIFYING LIMITED STRIKE

Senator MUSKIE. Would you outline a scenario that would justify in the mind of an enemy the launching of a limited strike of this kind. Against what kind of targets and for what kind of purposes would it be, considering the risks that we might misread it and not be self-de-

terred but launch a massive response? I am trying to read the mind of a Soviet political leader in the future who would be tempted to launch a limited strike.

Secretary SCHLESINGER. We have to be quite hypothetical about this. I was attempting to respond to the questions Senator Case asked about what the mortalities would be from such selective attacks, rather than predicting that such a set of circumstances would arise.

Senator MUSKIE. In order to do that, Mr. Secretary, would you not have to see what combination of targets there would be in a postulated limited strike, because just to take St. Louis does not give you anything.

Secretary SCHLESINGER. That is correct; we used St. Louis simply as a "worst case" example of collateral damage. I want to remind you that in none of the limited attack cases presented here today are the cities themselves attacked. The fatalities shown, particularly in the case of St. Louis, are the result of fallout created by the attacks on military targets only.

As you know, there has been a great deal of worry about Minuteman vulnerability over the past few years. The concern that has been expressed is about crisis stability and the arranging of circumstances so that neither side has a strong incentive to strike first in a counterforce mode in such crisis. The worst set of circumstances arises where both sides are relatively vulnerable to such strikes since that places a high premium on a first strike and that, in turn, drives both sides in the direction of preparing for a first strike. We have attempted to resist this tendency over the years by developing a high degree of invulnerability in our forces and so has the Soviet Union. Now a drawback, it is feared, of fixed land based systems is that as accuracy improves and reliability improves, one side or the other might be tempted in a crisis to attempt to reduce the weight of the potential attack of the other side by a major preemptive strike against these relatively vulnerable systems.

We attempt to avoid that situation by reducing vulnerabilities, by avoiding crises, and by maintaining stability in a strategic balance between the United States and the U.S.S.R. But those are the circumstances which could give rise to a Soviet counterforce attack on the United States in a crisis.

If you had, for example, an invasion of Western Europe and the Soviet Union under those circumstances is informed by the American Government that we are prepared to use our nuclear capabilities unless it desists, the Soviet Union at that time may conclude that the option for it to pursue would be to wipe out as much of America's nuclear retaliatory forces as it can and degrade its command control system. In effect, the Soviet Union would be sending a message to the United States that it had badly crippled our military strength and that we had better desist from the war—that the Soviet Union has won its objectives. Those are the kinds of circumstances that one could hypothesize.

I am not saying that such a development is highly probable, but rather that those are circumstances that we have to consider.

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SOVIET ATTACK AGAINST U.S. MISSILE FORCE

Senator CASE. Did not that example—or did I misunderstand you, in that example—did you not say that the Soviet Union might attack the missile force?

Secretary SCHLESINGER. Yes, sir.

Senator CASE. And try to knock it out. That means a complete attack against the missile force?

Secretary SCHLESINGER. Yes, and my recollection is that we were talking about 2 million fatalities from some types of attacks.

Mr. KING. About 800,000 fatalities if he attacks the Minuteman force with just one 1-megaton air-burst weapon per silo.

Senator CASE. That is direct fatalities?

Mr. KING. And fallout fatalities.

Senator CASE. Against a full attack by two missiles against each of our Minutemen?

Secretary SCHLESINGER. Let me give you those calculations.

Senator CASE. At simultaneous times? So you are not picking the weather and you have to take a chance it is going to be bad.

Secretary SCHLESINGER. Yes, sir.

Senator CASE. Only 800,000?

Mr. KING. That is with just one 1-megaton air-burst weapon on each silo. It is a conceivable attack if accuracy is good enough.

Secretary SCHLESINGER. Give me the chart again.

RESPONSE TO SOVIET ATTACK ON U.S. MISSILE FORCE

Senator CASE. It is not conceivable to me that that would not be regarded by the United States as the kind of attack which required all-out response.

Secretary SCHLESINGER. Well, of course, the President would have such an option under any circumstances but——

Senator CASE. Of course, he has that now, too.

Secretary SCHLESINGER. He has that option now [deleted]. But one is talking under these circumstances of the possible survival of about 95 million people who would otherwise be vulnerable. A President of the United States under those circumstances where, as a result of an attack against the ICBM sites, there are already approximately 800,000 fatalities, would know that if he responds by destroying the urban industrial base of the Soviet Union approximately 95 million American fatalities would be added to that number.

Now, I am not suggesting that he might not order an all-out attack against the Soviet Union. But that is precisely the question that Mr. Nixon raised and the Senate Preparedness Investigating Subcommittee previously raised—that he might well choose not to respond with an urban industrial attack against the Soviet Union but rather to respond selectively.

PRESENT U.S. CAPACITY TO RESPOND TO ATTACK

Senator CASE. What would we be able to do now with our present capacity and targeting ability against such an attack? Could we make a counterattack against their weapons?

Secretary SCHLESINGER. The answer is that we could make such a counterattack, but not very effectively. However, such an exchange at the present time is unlikely to take place for two reasons. First, the Soviets just do not have the required force structure at the present time. We would hope that they will stay in that position and not acquire the kind of force structure needed to make this kind of attack effectively.

Second, although the United States has the number of weapons, we do not have the accuracy and high confidence hard target kill capability to initate such an attack ourselves. That happens to be a very, very reassuring situation.

PREPAREDNESS SUBCOMMITTEE'S KNOWLEDGE OF NUCLEAR WEAPONRY QUESTIONED

Senator SYMINGTON. Several times you have mentioned the Preparedness Subcommittee in 1968. I know that the Preparedness Subcommittee has never really looked into the details in nuclear weaponry. That is one reason I went on the Joint Atomic Energy Committee—to learn more about the true force of our military establishment.

Secretary SCHLESINGER. Senator, the point that I was making with reference to that slide was that the Senate Preparedness Investigating Subcommittee had expressed interest in these kinds of selective attacks and in these kinds of options 6 or 7 years ago.

Senator SYMINGTON. Well, and I must add that I do not think, based on my years of experience now on the joint committee, that things that they thought at that time, and I was on the committee, would be their same thoughts today.

Secretary SCHLESINGER. Oh, I quite agree. All I am saying here is that what we have been talking about is not that novel.

IMPORTANCE OF HEARINGS

Senator SYMINGTON. I did not mean to take so much time but I do think, if I may say so, Mr. Chairman, that these hearings are vitally important to our future, our economy, and our defense posture. I would much rather have what you think as a former head of the AEC and present Secretary of Defense than I would anything we discussed in 1968; because in those days we were very ignorant about nuclear weapons.

POSSIBILITY OF DEVELOPING LIMITING PARAMETERS

Senator MUSKIE. Mr. Secretary, the notion that somehow it is possible to develop limiting parameters among the consequences of various degrees of nuclear involvement seems to me unreal.

For example, on the very hypothesis that Senator Case posed to you about taking out our Minuteman force with two warheads per Minuteman silo, we have this memorandum from the Arms Control Agency. I quote:

Consider the following bounds on the uncertainty relative to casualties resulting from an attack against Minuteman silos if the P-95 population protection factor is unknown, and the weather is not selected to minimize covering popu-

lated areas without fallout. The urban casualties can range from 145,000 to 50 million for two one-megaton warheads arriving at each Minuteman silo. Note this does not include casualties among the rural population.

I do not know enough to evaluate their judgment any more than to evaluate the opinion you have stressed. But these are two opinions expressed by people presumably more knowledgeable than I in this field. It seems to me that suggests the difficulty of developing parameters which can assure the Soviet general staff or our general staff that in order to deter the other side from a massive response it is safe to launch a minimal attack assuring that you will only get a minimal response in return. In the situation which you hypothesized, if the President of the United States knows the possibility is not that the damage to our population will be only 800,000, but that it could be 50 million, why should he limit his response? He sees these missiles launched. He does not know at that point whether the damage here would be on the lower range or the upper range. Given those uncertainties, should he give the Soviet Union any encouragement to believe that our response will be less than maximum?

Secretary SCHLESINGER. I think that the question that you raise is a good one, Mr. Chairman.

Let me deal with the technical parameters first.

We would have to go back and see just what kind of assumptions lay behind those calculations. Our calculations have assumed 450 REM's [Roentgen Equivalent Man], I believe, as the fatal dose for members of the population or, alternatively, something on the order of seven PSI [Per Square Inch] over pressure. Of course, this assumes that there is no evacuation of population or change in our civil defense programs; the fatalities could be substantially reduced if we had such new programs.

But I find it very hard, Mr. Chairman, to conceive of a set of believable circumstances in which the fatalities would be 50 million from an attack on the Minuteman force alone.

Now, I would also mention that our figures include consideration of two warheads targeted on each silo, although the Soviets are not obligated to drop 2,000-odd one-megaton warheads on American soil.

There is, of course, a significant range of uncertainty. I think that underlying your comments was one of, what shall I say, the reassuring aspects of that uncertainty. To the extent that there are these uncertainties, and they are perceived by the leadership on both sides, they do impose restraint, and they contribute to deterrence. In other words, one cannot be sure, and to the extent that one cannot be sure, it makes a decision to launch such an attack more agonizing. To the extent that one has these high yield weapons which we have assumed in the data that we have presented, of course, one cannot say that the mortalities will be restricted to a certain level.

In a carefully planned attack, however, one can reduce those collateral mortalities significantly, if that is one of the attacker's objectives.

Senator MUSKIE. But with respect to the other side, the decision-maker responsible for determining the nature of the response, he will not know what the limitations are until the strike is over.

Secretary SCHLESINGER. Quite right, Mr. Chairman.

POSSIBILITY OF ENCOURAGING SOVIET UNION TO CONSIDER LIMITED STRIKE

Senator MUSKIE. What concerns me about all of this, is that to the extent that you arm the United States with a range of responses and to the extent that you encourage the Soviet Union to believe that the United States might be tempted to use the lesser than the greater response, do you not to that extent encourage the Soviet Union to consider the possibility of a limited strike?

Secretary SCHLESINGER. I do not think "encourage" is the right word. If the Soviet Union is prepared to consider these possibilities, and one must infer from the weapons developments and deployments that are already underway that they will be prepared to consider them then what the United States does, I think, will have relatively little impact on the various strike alternatives that they might consider.

What was stated by President Nixon, what was stated previously by the Senate Preparedness Investigating Subcommittee, were the circumstances in which the United States would find itself if it did not develop, in detail and in practice, the kinds of selective options we are talking about. There were those who were worried at that time that the Soviet Union might be contemplating the acquisition of forces for such selective strikes. So I doubt that what we do would have much influence on the decisionmaking on the other side.

Now, there is one point that you mentioned that I would like to amplify, if I might, Mr. Chairman.

REASON FOR BUILDING LIMITED RESPONSE CAPABILITY

Senator MUSKIE. Before you get to that, why are we talking about building this limited response capability, if, as you say, what we do is not going to matter much in influencing the other side?

Secretary SCHLESINGER. With regard to their planning of their options, our ability to respond in kind, if they were contemplating such a limited strike, would tend to deter it. If the only option we had under the circumstances were a massive urban strike against the Soviet Union, they might feel that because of the hundred million fatalities involved on our side, that we would be self-deterred and that they could obtain political benefit, political-military benefit by either threatening or conceivably employing such a limited strike against the United States.

IMPLICATION OF SEVERAL LIMITED EXCHANGES AND NO MASSIVE RESPONSE

Senator MUSKIE. What that line of argument implies is that there can be several exchanges between the two adversaries, using limited responses, on the assumption that no one of those exchanges is going to bring the other side to respond with a massive strike?

Secretary SCHLESINGER. The question here is whether they might not go all the way, or probably would not go all the way. There is always the possibility that one or both sides would go massively, and that the limited exchange could escalate to all-out strikes. We have continually underscored that possibility.

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What we are saying here is that although we can give no assurance that one can avoid escalating to all-out exchanges, there is a possibility that one can avoid such escalation. With the hundreds of millions of fatalities involved in an all-out nuclear exchange, both sides have a very powerful incentive to avoid escalation if a nuclear exchange should ever start.

EFFECT OF BUILDING LIMITED RESPONSES

Senator MUSKIE. What concerns me is that in building these limited responses we cloak the possibility of massive exchanges, whereas if we are going to continue to rely on the doctrine of massive retaliation, then that possibility should always be clear and evident or we abandon it for something else.

Secretary SCHLESINGER. That capability is always there and the President, any President, can stress either the possibility or his determination to proceed with such a strike.

Senator MUSKIE. But the central core of this debate is the question of self-deterrence. If we add evidence to our doubts upon our willingness to go the full route, it seems to me that we add assurance to the other side's belief that we will be self-deterred.

Secretary SCHLESINGER. I think——

Senator MUSKIE. Therefore, you encourage the development of limited warfare as an acceptable kind of conventional military involvement. And when you escalate the possibilities to that level, it seems to me you escalate the possibility for ultimate nuclear war.

POSSIBILITY OF OBTAINING ASYMMETRY OF RESPONSE

Senator PEARSON. I am bothered by the same thing. I can understand asymmetry of power and conventional forces where you meet every attack at the appropriate level of force, but on strategic forces, because the limited action is so great, even at the lowest level, and because the time factor is so short, I do not see how it works.

Secretary SCHLESINGER. That is a different question from the one that the chairman asked. What you are asking is the technical question as to the operational aspects of selective strikes, how do they work, whereas——

Senator PEARSON. You have been using "to respond in kind," or words to that effect, and "flexibility," but a limited strike on their part on our missile systems where we could perhaps respond in like manner is of such a high level of fatalities and damage. I do not understand how we would respond because of the time factor, because of the danger of taking out missiles or because of the total number of fatalities that would result in such a limited attack.

Secretary SCHLESINGER. Well, I am not disposed to argue against the point of view that you and the chairman have expressed, that the attractiveness of such an attack will be very, very low and if there is not such a threat, then we are going to avoid nuclear war, which is a desirable outcome.

Senator PEARSON. If you can get any sort of flexibility, if you can get any sort of asymmetry of response, that would be wonderful.

Secretary SCHLESINGER. That is the objective here.

Senator PEARSON. What I cannot understand is how you can do it.

Secretary SCHLESINGER. Well——

Senator CASE. Could I just add one more thing?

Secretary SCHLESINGER. Going back to my first observation, the Soviets are not necessarily limited to the strike that we have outlined here, and in response to the questions raised by Senator Case, they could, for example, just decide to go after the communication systems to our submarines.

I mention that because in Senator Muskie's State there is a communication facility at Cutler, Maine.

Now, it is not clear to me that the Soviets, should they be risk-takers of that sort, would be prepared to believe that the United States would respond with a strike at the urban industrial base of the Soviet Union if they simply went after a facility at Cutler, Maine. That would be disproportionate. I think the number of mortalities in the event of such a demonstration strike would be exceedingly low.

DESIRABILITY OF LARGER NUMBER OF OPTIONS

Senator CASE. But, Mr. Secretary, this all goes back, I think, to your point——

Secretary SCHLESINGER. No, sir, I may have reawakened it.

Senator CASE. You did not start it, of course, but the point is that we have never been limited to an all-out attack upon Soviet cities in retribution. We have always had options. The question is whether it is necessary or desirable to attempt to improve our capacity so to give us a larger number of options with the possible danger that our action in doing so will be construed by the enemy as an attempt, for instance, to achieve a first strike capability.

Secretary SCHLESINGER. You have got three good questions there——

Senator CASE. I know.

Secretary SCHLESINGER [continuing]. Which I will attempt to deal with shortly.

[A recess was taken to vote.]

DEGREE OF UNCERTAINTY ABOUT FATALITIES

Secretary SCHLESINGER. The point that I wanted to make was with regard to the numbers that you cited.

Offhand, I can think of virtually no set of assumptions that would get you to 50 million fatalities from an attack on Minuteman only, unless the Soviets ground-burst very large yield weapons with a high degree of inaccuracy, including going after other SAC facilities that are close to urban areas. That is the only way I think you can get to those numbers. What we are talking about are 1-megaton weapons, not the kinds of 20- or 25-megaton weapons that they have on their SS–9's, and we are talking about air-bursting them. Those are things that the Soviet Union can control. They can control whether they air-burst or ground-burst their weapons. They can control the size of the weapons. So while they might be faced with the range of uncertainties which was specified in the ACDA [Arms Control and Disarmament Agency] response to your questions, they can control these uncertainties to a considerable degree.

Now, what we have said is that there is a degree of uncertainty here. But I do not think this range is as broad as indicated in that ACDA response. One should recognize that if they air-burst their weapons and control the yields, that they can dramatically reduce the number of fatalities.

Senator MUSKIE. Talking about successively launching and precisely targeting with particular limits of performance, 2,000 nuclear weapons?

Secretary SCHLESINGER. Yes, sir.

Senator MUSKIE. It has never been done.

Secretary SCHLESINGER. Well, we hope it stays that way.

Senator MUSKIE. How do you justify any precise prediction as to the consequences with all the uncertainties involved in performance?

Secretary Schlesinger. We cannot give you a precise estimate encompassing all of these uncertainties. We have given you a precise estimate based upon certain assumptions—that we use the existing civilian defense facilities, that the fatality level is 450 REM's or 7 PSI, etc. If you accept those assumptions and use the present distribution of population, I think we can give a fairly precise answer. One can alter those assumptions and one could come out with higher levels or with lower levels than we have indicated, but the point that I am making is that any attack by the Soviet Union on our Minuteman force only will not get you up to 50 million fatalities. That range of uncertainty is broader than actually exists.

Senator MUSKIE. I will put in the record excerpts from the ACDA analysis. They go into an extensive description of the influence of the population protection factor in explaining their projection.

Secretary SCHLESINGER. We would be delighted to comment on that paper for the record.

Senator CASE. I wish you would.

Senator MUSKIE. Can we provide the Secretary with a copy of this before he leaves and then——

Senator CASE. If you would do that, the staff would then circulate it to all of us.

[The information referred to follows:]

EXCERPTS FROM ARMS CONTROL AND DISARMAMENT AGENCY ANALYSIS OF POSSIBLE FALLOUT EFFECTS[1]

Premise No. 3.—Limited damage from a nuclear attack is not a matter of policy choice.

* * * * * * *

The Academy performed some calculations using the RPM-WIND-Fallout Model which can shed some light on the expected casualties resulting from an attack against Minuteman silos.

Consider the following bounds on the uncertainty relative to casualties resulting from an attack against Minuteman silos if the P95 population protection factor is unknown, and the weather is not selected to minimize covering populated areas with fallout. The urban casualties can range from 145,000 to 50,000,000 for two—1MT warheads arriving at each Minuteman silo. Note this does not include casualties among the rural population. The weapon fission-fusion factor is assumed to be one and ground burst is used throughout the attack. To confine the fatalities of the lower bound (145K) rather stringent protection of the exposed populace is necessary. Potentially 65% of the P59's are in jeopardy to radiation from fallout for a two—1MT attack. That is to say that realistic variation in

[1] Charts and graphs referred to are in the committee files.

weather conditions show that 65% of all P95's can expect some fallout damage under some weather conditions. The percent of P95's that do suffer some damage reduces to 15–20% depending upon the weather at the particular time of the attack. The subset of 20% that is exposed to radiation from fallout requires a protection factor ≥100. To obtain this level of protection requires that populace remain in a primary shelter with a fair amount of shielding. The average below ground basement with no exposure and a roof at least one story above may provide the protection. The stay in the primary shelter has to be extended over some number of days which is greater than 2, and could extend up to about a month. If the populace does not remain in shelters but some cleaning is attempted a correction to the protection factor has to be made. The attached curve is an example of the type of corrections needed to obtain an equivalent protection factor. Note in the curve, exposure of one hour per day while in transit reduces the effective protection factor markedly. A constant effective protection factor of 20 allows for a shelter protection factor in the range of 20 to 100 and a corresponding work shelter protection factor of 52 to 25.

* * * * * * *

Contours of constant collateral value kill of P95's are also included for the Minuteman silo attack. These contours are shown as a function of yield and protection factor. The weather is fixed as "Winter Mean," the fission-fusion factor is 1 and ground burst is used. If two one-megaton warheads are used against the silos a very good estimate of value kill is obtained entering at the two-megaton level of yield.

On this same graph the expected variation resulting from typical day weather for the four seasons is shown when PF=18 (1/PF=.0555) and the attack is two—1MT weapons per silo. The extreme range of population kill (P95 only) is 145,000 to 13,000,000 for a two—1MT attack against Minuteman silos. A mean or expected kill is 4,500,000 for the above case.

Ms. Hoeber is more correct in her assertion that different qualities for the attack weapons such as reduced FF, lower yield, increased altitude of burst and improved CEP, etc., can reduce the fatality levels to tens of thousands. Consider for example a fatality range of 30K.

To attain the 30K fatality range the warheads sent to the Minuteman sios would need an effective yield no greater than .3 MT and the populace would require high protection factors against fallout (>100) if ground burst is used. If the altitude of burst is increased the requirements on protection factor can be reduced.

Some additional insight on fallout fatalities and their relation to warheads delivered to Minuteman complexes can be obtained from the following calculation using the RPM Model and the U.S. P95 population data base to investigate collateral damage. This case looks at a very limited attack, three silos only in the Whiteman complex.

Given the set-up as defined with the attacker having available the fall mean weather to influence the choice of the N, S, E, or W edge of the complex for a three silo attack but not knowing how large the CEP in this attack was. Suppose the U.S. P95 population is shielded from radiation by a protection factor of 18 after impact. If the attacker was wrong by 12 hours in his prediction of weather (air mass movement) at the time of attack the expected number of fatalities is 3,300 with a variance of 3,000. Note this is a slow CF response by the attacker, and for six weapons delivered he can expect a reasonably large number of fatalities.

If however the same conditions existed but the actual CEP was in the order of less than a half mile, the attacker using the six one megaton warheads could make a selection of the particular three silos to attack with a very small expected fallout fatality. For these conditions (weather) he would choose the southern edge of the Whiteman complex for his three silo attack. Again this assumes all population exposed to radiation is under cover to a protection factor of 18.

The maximum expected fallout kill not taking into account the weather air mass movements and with the exposed populace not protected to the PF = 18 level could range for the six weapons against three silos from small to 1,000,000 fatalities. An attack against the northern and western edges of the Whiteman complex could give rise to these fallout fatalities. The eastern edge maximum could reach 700,000 and the southern edge maximum could reach 200,000. For a

very limited attack against Whiteman if the weather and population protection is not carefully taken into account, the number of fatalities from fallout can be high.

The purpose of the above is to indicate that it is difficult to control the fallout fatalities by taking weather into account in general only, even though the size of the attack is very small. The weather and the protection factor for the populace play important roles.

By going in the direction of higher altitude burst rather than ground burst and improved CEP the collateral fatalities on populace can be kept in the tens of thousands.

Damage from a nuclear attack can be limited to some extent by the attacker and the defender and it is a policy choice. The decisions that are necessary to limit damage are policy choices. The question is, what decisions are acceptable politically. The changing of weapon characteristics is more easily accomplished then going through a massive civil defense indoctrination from the standpoint of internal politics of the U.S. Yet if the S.U. chooses civil defense and does nothing about its weapon systems, an imbalance could exist where the U.S. is more vulnerable than the S.U. The U.S. improving its weapon system, i.e., reduced yield, improved CEP, etc. and the S.U. improving its civil defense but no weapon system improvement, i.e., not reducing yield etc., creates an imbalance that tends to make a U.S. preempt threshold higher.

In summary, contrary to the premise, limited damage from a nuclear attack is a policy choice.

Department of Defense Comments on ACDA Paper on Collateral Fatalities From An Attack Against U.S. Minuteman Silos [1]

The ACDA paper includes a chart which contains data which permits the reader to derive the collateral fatalities associated with an attack against all 1,000 Minuteman silos as a function of warhead yield (in megatons) and population protection factor. For example, the paper states that if two 1-megaton warheads are targeted against the silos, a good estimate of the collateral fatalities can be obtained from the chart. Specifically, the expected result from this attack is stated as 4.5 million urban fatalities, and it is further noted that the extreme range of estimated urban population fatalities is 145,000 to 13,000,000.

The Office of the Secretary of Defense (OSD) and the Office of Preparedness (OP) have each performed independent calculations (with different computer models) which give results for this postulated attack on U.S. ICBMs of less than 2 million urban fatalities as compared to 4.5 million in the ACDA paper. Inclusion of rural fatalities increases the total fatalities in the OSD and OP calculations to on the order of 5 million; the ACDA calculations did not include the rural population.

The following two assumptions can account for the higher ACDA figure of 4.5 million urban fatalities as compared to the OSD/OP figures of less than 2 million: (1) the ACDA results assumed the two 1-MT weapons were ground burst, whereas the OSD/OP results assumed a height of burst which maximizes the weapon's lethal radius due to air-induced shocks; and (2) the ACDA results assumed the 1-MT weapons had a fission content of 100% as compared to a mixed arsenal ranging from [deleted] fission content in the OSD/OP results. (See slide 12 for an explicit treatment of the sensitivity of collateral effects to ground-burst weapons and an increased fission content.

Based upon OSD calculations in which the collateral effects were tested for their sensitivity to significant changes in various assumptions, and the fact that the OSD/OP figures shown above assumed March winds (the worst month for fallout effects), it appears to us that the ACDA paper significantly overstates the possible upper bound (13 million) of urban fatalities that could result from a 2-weapon per silo attack on U.S. ICBM's. Moreover, if one weapon per silo and cleaner weapons [deleted] are assumed, the estimated fatalities (urban and rural) could be less than one million.

The key point to consider, however, is not whether a Soviet attack on U.S. ICBM's would cause, say, 2 versus 4.5 million urban fatalities, but rather that

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[1] Actually entitled "Premise No. 3. Limited damage from a nuclear attack is not a matter of policy choice." The paper contains the conclusion that "Damage from a nuclear attack can be limited to some extent by the attacker and the defender and it is a policy choice."

the losses from such an attack would be far less than the 100 million fatalities that would result from a direct attack on our cities. It is for this reason that the President's Foreign Policy Reports called for options other than the mass destruction of enemy civilians in the face of the certainty that it would be followed by the mass destruction of U.S. civilians.

Although the ACDA paper contains the statement that "the extreme range of population kill (P95 only) is 145,000 to 18,000,000 for a two 1-MT attack against Minuteman silos," the paper also contains a statement that "the urban casualties can range from 145,000 to 50,000,000 for two 1-MT warheads arriving at each Minuteman silo." The paper presents these estimates as bounds on the uncertainty if the population protection factor is uncertain—i.e., if the average, nation-wide population protection factor varies from 2 to 100 or more.

With regard to the 50 million casualty figure, the following points can be made:

A protection factor of 2 is totally inappropriate for use as a planning factor for such calculations. An appropriate nation-wide average population protection profile, based upon fallout shelter surveys, is as follows:

Protection factor: Metropolitan complexes [deleted].

Protection factor: Rural areas [deleted].

The 50 million figure is not a direct calculation from a fallout-effects model with a discrete set of inputs but rather an extrapolation beyond a limited number of data points. Specifically, a number of fallout-effects calculations were performed which resulted in the range of urban fatalities of 145,000 to 18 million, with a mean of 4.5 million, discussed above. These results were then used to derive the estimated upper bound of 50 million urban casualties assuming a national protection factor of 2.

The validity of the extrapolation is particularly questionable since the extrapolated upper bound falls outside the regime of contours of constant kill value presented in the graph in the paper. That is, assuming an urban population of 145 million people, 50 million casualties would fall on a .34 constant kill contour which is not shown on the accompanying graph.

Assuming that the Soviet weapons have a fission fraction of 100% is inappropriate for missile reentry vehicles in the megaton class. It would be a very inefficient use of nuclear materials and result in larger, heavier reentry vehicles, thus reducing the number of weapons each missile could carry. More appropriate estimates regarding the characteristics of Soviet missile payload, including fission/fusion fractions, have been provided separately to the Committee.

An OSD calculation, using the same assumptions as in the ACDA paper—including the inappropriate nation-wide protection factor of 2 but with a [deleted] fission fraction vice 100%—resulted in the following estimates:

[In millions]

	Fatalities	Nonfatal injuries	Total casualties
Urban	6.9	1.3	8.2
Rural	8.0	1.4	9.4
Total	14.9	2.7	17.6

The 6.9 million figure compares to the extrapolated 50 million figure in the ACDA paper.

In sum, the 50 million figure appears to us to be an invalid extrapolation beyond a limited set of data points, with an incorrect population protection factor and an inappropriate assumption about the fission content of Soviet weapons.

CIRCUMSTANCES WHICH COULD GENERATE LIMITED NUCLEAR EXCHANGE

Senator MUSKIE. You have given us one hypothesis of a possible set of circumstances which could generate this kind of exchange.

Secretary SCHLESINGER. Circumstances that we seek to avoid materializing.

Senator MUSKIE. I think it would be useful to know the hypothetical range of possibilities which could be used to justify that kind of a limited nuclear initiative on the part of either side and that kind of limited nuclear response on the part of the other side.

Secretary SCHLESINGER. Mr. Chairman——

Senator MUSKIE. You do not throw these things around as casually as you put up a Berlin wall. I find it hard to visualize the circumstances in which nuclear weapons would be visualized as that kind of thing. I think, though the instance you pose is something one can at least rationalize as being a possibility. I would like to know to what extent there are others.

Secretary SCHLESINGER. Mr. Chairman, I would like to fully associate myself with your remarks. I do not think these circumstances will arise if we maintain the appropriate degree of balance. I think that we can with very, very high confidence deter such attacks. The whole purpose of what we are talking about is to avoid those circumstances and to eliminate whatever niches may exist with regard to the success of deterrence across the whole spectrum of possible threats.

SOVIET GAMBLE ON UNITED STATES SELF-DETERRENCE

Senator MUSKIE. Let us examine that one hypothesis concerning a conventional Soviet initiative in Europe and our option is massive nuclear response, brushing aside the possibility that we could retarget a limited response. Let us assume that it is an all-out nuclear response. The Soviets then must gamble that we would be self-deterred. That would have to be their gamble.

Secretary SCHLESINGER. And they have been told we would be, by General DeGaulle and others.

Senator MUSKIE. Unless they have a special pipeline to DeGaulle now, he may have changed his mind, wherever he is. He has had broader experience.

Secretary SCHLESINGER. [Deleted.]

Senator MUSKIE. But certainly the debate in this country might feed the notion that we would be.

Secretary SCHLESINGER. I think, Mr. Chairman, Eric Severeid commented one evening that General DeGaulle may be in error but he is never in doubt.

Senator CASE. That applies to a couple of our friends in the Senate.

Senator MUSKIE. I think the Senate is one of those natural breeding grounds for people of that description.

Senator CASE. As opposed to the Cabinet?

Senator MUSKIE. Yes. I really think that gamble is a greater deterrent to the Soviet Union than giving them reason to believe that we would offer limited response. I guess that there is no other way of putting it.

Secretary SCHLESINGER. It depends on the Soviet perceptions, Mr. Chairman.

Senator MUSKIE. It sure does.

Secretary SCHLESINGER. The advantage of going in this direction is that you close off any kind of ambition that you can speculate on on the part of the Soviet leadership. You are deterring across the entire spectrum of risk. If they regard the United States as prepared to go

for a massive strike in retaliation, our ability to retaliate more selectively does not weaken that deterrent. If they consider the United States as prepared to contemplate selective strikes in retaliation, once again they seek risks that affect their judgments. The whole purpose here is to create the uncertainties that we can with high confidence assume will continue to deter them.

IN-BETWEEN DETERRENT IN EUROPE

Senator MUSKIE. May I say I understand the need for a conventional deterrence in Europe as well, but that in-between is where I cannot get the feeling——

Secretary SCHLESINGER. Of course, we have an in-between deterrent in the sense that we have war plans that contemplate the employment of tactical nuclear weapons in Europe.

What we are doing here is to apply the same selectivity with regard to the strategic forces as has been historically contemplated with regard to the tactical nuclear force.

CREDIBILITY OF TACTICAL NUCLEAR FORCE

Senator MUSKIE. I have always had mixed feelings about the credibility of those tactical——

Secretary SCHLESINGER. Once again, you are thinking of circumstances in which they would be employed with high confidence. Looking at it from the Soviet perspective, any possibility of their employment, whether it is 3, 4, 5 percent, has a deterrent effect. We do not have to have a 100 percent confidence on our part that we would actually employ them. As long as our opponents perceive there is some likelihood, even a low likelihood of employment, that will have a restraining influence.

Now, Senator Case raised a triple-headed question just before he departed and I do not remember the three parts of it, Senator.

IS PROPOSAL REALLY NEW

Senator CASE. If I could start again. As I say, you started this whole razzle dazzle, as I recall it, at least to my thinking, when you made a couple of speeches about how we had to have a more effective capacity to engage in limited strategic warfare. I am not sure that you translated that at any time in any direct way to specific budget requests. You could, of course, direct us to the instances in which you did and to what you asked for by way of requests. I do not recall when you first raised the subject, but it immediately aroused concern among a number of people, including me, as to whether this really is something new, and if it was, would it not suggest to the Soviet Union, for example, that we intended to concentrate more on preparing for attacks less than those involved in all-out destruction.

This raised questions in the minds of a number of us whether this would not be perceived as, for example, an effort to acquire a counterforce strategy.

Secretary SCHLESINGER. Right.

Senator CASE. And related to this was the damage that that perception would create in the way of increased armament on the other side. This is what we are talking about.

Secretary SCHLESINGER. Yes, sir.

DR. PANOFSKY'S SUGGESTIONS

Senator CASE. Counter to this is the suggestion that some scientists have made, there is not any real possibility of a low-level nuclear exchange.

Dr. Panofsky, for instance, suggests any exchange is bound to escalate. It seems to me that this suggestion makes a great deal of sense, although the possibility exists that in a given situation both sides would step back and state that we have gone far enough.

Secretary SCHLESINGER. Yes, sir.

Senator CASE. Dr. Panofsky's second suggestion—quite strongly put forward—is that there is no such thing as low-level nuclear exchange because the less likely one is likely to result in tens of thousands, if not millions of casualties, that this would represent an unacceptable situation and one on which we ought not to base any strategy.

The third is that we have a sufficient number of options related to low-level exchanges to deter any such attacks by the other side.

EXTENT OF DOD STUDIES AND CONCLUSIONS

All of these, I think, are points that are involved in our inquiry. What I tried to do was to find out the extent to which the Defense Department had studied and had come to conclusions as to the level of casualties that would be expected on our side in the various conceivable low-level exchanges of the kind that I think you are trying to prepare for.

Secretary SCHLESINGER. Yes, sir.

Senator CASE. I have not had the feeling that all these studies have been completed. I think you indicated to me several times, when we had meetings together, that the matter was still an ongoing proposition.

Secretary SCHLESINGER. Yes, sir.

WHAT SUBCOMMITTEE IS INTERESTED IN

Senator CASE. We are interested not only in direct casualties from blast and fallout, but also the indirect casualties resulting from man-years lost, the effect on the economy and the local area, the demands upon medical facilities, the amount of land that would be lost, the psychological impact—all of these consequences we are interested in as bearing upon the question of whether the attacks you postulate are really realistic alternatives.

Secretary SCHLESINGER. I think that is very——

Senator CASE. If I asked a number of questions I have done so because they are all involved.

Secretary SCHLESINGER. I had hoped that you would rephrase the 3 questions that you asked before, Senator, but now you have added about 12 or 15 additional ones.

Senator CASE. You cannot discuss these matters in isolation.

Secretary SCHLESINGER. Let me try and answer as many of them as I can.

DID SECRETARY'S SPEECHES REPRESENT STRATEGY OR RHETORIC?

Senator CASE. The end question, Mr. Secretary, is whether you were really asking for anything new, or whether you were just making a speech for a useful purpose—a propaganda purpose—designed to scare the Russians into thinking that they had better make a deal with us now or we would get pretty tough. Now, that is not an unworthy purpose, but did these speeches represent strategy, or, rhetoric?

Secretary SCHLESINGER. It is a strategy, Senator Case. The President of the United States should possess these options.

Senator CASE. But does he not now?

Secretary SCHLESINGER. Let me try and go through these questions and talk for about 5 minutes.

Senator CASE. Without being interrupted.

U.S. PRESENT AND PREVIOUS OPTIONS

Secretary SCHLESINGER. "The first question you raised is whether we possess options at the present time or possessed options previously. The answer to that question is "Yes"; we had a number of options that had been built into our war plans, but all of these options were at a very high level which would have caused major fatalities in the Soviet Union. So we had options, but all of them that had been specified in the SIOP were at a fairly high level.

However, if you ask the people who do the SIOP planning, they will tell you that we can always do selective strikes, if that is what is wanted. But there had not been a sufficient examination of the details so that one could say definitively that we had practicable low-level options. So one had an array of several options at the upper end of the spectrum, each of which would have imposed major damage on the Soviet Union.

Thus answer is "Yes; conceptionally, we had options." In practice, we had a very limited number of massive options. What we are trying to do now is to broaden the spectrum and particularly to provide some options at the lower end of the spectrum. That is, I think, the major difference between the options that we are developing now and the situation that existed previously.

POSSIBLE ESCALATION OF SMALL NUCLEAR EXCHANGE

Another question that you raised with reference to Dr. Panofsky had to do with inevitability of a small nuclear exchange escalating to the top, or as he put it, any nuclear exchange is likely to escalate to the top.

Senator CASE. I think I am being fair in my understanding.

Secretary SCHLESINGER. I think that is a good question. It certainly is a possibility, as you indicated. We can give no assurance that a small exchange would not escalate to a higher level. We simply are stating that because there is a possibility of a small exchange escalating to the top, that is no reason why we must make it a certainty by going all

the way to the top ourselves. Just because you reach that pessimistic conclusion at the outset does not means that you must go and bash up the urban industrial base of your opponent, knowing full well that he will do the same thing to you. That is making a certainty of what would otherwise be an uncertainty.

POSSIBILITY OF TENS OF THOUSANDS OF FATALITIES

You mentioned the possibility of tens of thousands of fatalities and that we ought not to base any strategy—I caught your phrase—on the possibility of that number of fatalities. I think that one must recognize that the assured destruction strategy that we have advertised for many years is based upon the threat of inflicting 100 million fatalities on the Soviet Union in retaliation and there are questions, moral questions indeed, about whether we ought to base our national strategy on the contemplation of the certainty of 100 million fatalities on the other side.

One must be as demanding and scrutinizing of the emphasis on assured destruction as the sole resource of American strategy, as one is of the more limited options. One has got to deal with them in a balanced way. I would suggest that when one gets through with such an examination, one comes to the conclusion that deterrence is enhanced by having the broader range of retaliatory options.

SOVIET PERCEPTION OF QUESTS FOR ACCURACY AND HIGHER YIELD

You asked, Senator Case, whether the Soviet Union would perceive our quests for accuracy and higher yield weapons as representing a threat to their own force structure, and that because of these perceptions, whether they would take actions which could otherwise be avoided.

Will you give we slide 18?

[The information referred to follows:]

SLIDE 18

[Supplied by Department of Defense]

"STRATEGIC INITIATIVES" AND ESSENTIAL EQUIVALENCE

The strategic initiatives:

Are in response to current Soviet programs;

Are to provide the United States with options to maintain essential equivalence with the Soviets;

Are not a result of a U.S. desire to improve its flexibility to respond to possible limited nuclear strikes.

A flexible strategy:

Can be implemented without procurement of new or additional weapons;

Improved planning and C³ are the key ingredients;

Improved accuracy and a wider range of weapons yields could, if desired, be procured for a part of the U.S. strategic force to "clean up" some of the possible response options.

There are two aspects to the answer to that question. The first aspect is that the Soviet Union, much to our astonishment, had proceeded last year with a set of development initiatives that are surprising in their depth and strength. Their new land-based missiles possess throw weights which on the average are three times that of the previous

array of missiles. They appear to be acquiring on the order of 7,000 or 8,000 MIRV's just in their ICBM force, let alone their SLBM force. [Deleted.] I would hope that we would be able to persuade them not to deploy those new missiles up to the limit of the Interim Agreement, but they continue to say that they have spent the money on development on the SS–17, SS–18, and SS–19, and they are going to deploy them.

We have very carefully distinguished, Senator Case, and I hope that you will join in explaining this distinction, between the change in targeting doctrine and the set of strategic initiatives that we are proposing. The change in targeting doctrine can be implemented without the procurement of any additional weapons. Accuracy contributes somewhat to the effectiveness of the new targeting doctrine, but it is not essential for the implementation of that doctrine. We do not have to acquire a single additional weapon. We could have selective responses even if we had a smaller force structure than we presently have, and with no greater yields.

The change in targeting doctrine can be abstracted from any change in our force structure. The only thing that we need here is improved planning, which we can do at low cost or no additional cost, and improved command, control and communications.

We have asked for several hundred million dollars this year for improvements in command, control and communications.

So the change in targeting doctrine should be separated from any changes with regard to development, procurement, and deployment of new weapon systems.

Senator CASE. You would want that $100 or $200 million?

Secretary SCHLESINGER. In any event.

Senator CASE. For that, in any event?

Secretary SCHLESINGER. Yes, sir.

Senator CASE. So this is not relative to this subject, at least primarily?

Secretary SCHLESINGER. Those command, control and communitions improvements cannot affect Soviet perceptions with regard to any risks to their forces.

SOVIET PERCEPTION OF U.S. INITIATIVES

In addition to that, we have sent up to the Hill requests for certain other things. We have sent up to the Hill a request for a new, heavier throw weight ICBM. We have requested money for Trident.

Senator CASE. In what statement is that request? Is this for research?

Secretary SCHLESINGER. The new ICBM is R. & D. We have stated unequivocably that we would prefer not to deploy that heavier throw weight ICBM and that we hope that the Soviet Union will refrain from the full deployment of their heavier throw weight ICBM's.

When I submitted to the Congress last year a request for money for a new SSBN, which would have smaller tubes than the Trident submarine, I made the point that this would limit our throw weight and that we were prepared to restrain ourselves if the Soviets were pre-

pared to restrain themselves. So the strategic initiatives, which you correctly stated might lead the Soviets to perceive a risk to their force structure, are something that can be separated from the change in targeting doctrine.

We are prepared to renounce any one of those strategic initiatives, provided that we get reciprocation by the Soviet Union. It is advantageous to the Soviet Union not to proceed with these new developments because they will drive us into matching actions and both sides will be worse off. Accordingly, I would like to distinguish very sharply between the strategic initiatives that could lead to the perceptions that you mentioned, but which we are prepared to withhold, and the change in targeting doctrine which I think contributes to deterrence overall. By and large, I think that most individuals in the arms control community agree that greater flexibility by itself is a desirable change. They were rather unhappy being anchored to the notion that the only thing we could do in retaliation to even a small nuclear attack was to bust up the urban industrial base in the Soviet Union.

Senator CASE. Mr. Secretary, I appreciate that statement. It is eloquent, it makes sense.

May I paraphrase a couple of things you said?

Secretary SCHLESINGER. Yes, sir.

Senator CASE. And I do not want in any way to put words in your mouth. We really have had trouble understanding you and what difference, if any, there is between you and Dr. Kissinger. I will continue to raise these questions until I find out a little better myself.

Secretary SCHLESINGER. On these matters, I do not think there is any difference.

Senator CASE. I do not think there is either, not much in any event.

USEFULNESS OF PROGRAMS AS BARGAINING CHIPS

To some extent, from what you have said, I gather your thought is that these programs are useful as a bargaining chip. That is a bad word. But what you are saying is that the Soviets are being told, as you would see it, that if they are willing to slow down we will not do some of these things we are thinking we might want to do—that we will reduce some of our options if they will reduce some of theirs.

NEW INITIATIVES SENT TO HILL

Senator PEARSON. Were the new initiatives you sent up to the Hill all in relation to selective strikes?

Secretary SCHLESINGER. No, sir. As I have indicated, we do not need a heavier throw weight ICBM in order to have targeting flexibility.

Senator PEARSON. I understand.

Secretary SCHLESINGER. Those initiatives are in response to Soviet programs that we have perceived since last summer. We are prepared to renounce them if the Soviets reciprocate. We would prefer not to deploy any greater throw weight. We think it would be advisable for both sides to restrict their missile throw weights, but we are concerned that the Soviets unilaterally might increase theirs.

Senator CASE. That part of our response was almost entirely a matter of counter?

CONCEPT OF BARGAINING CHIP

Secretary SCHLESINGER. I would like to broaden the concept of bargaining chip. What I am saying is that there must be a functional relationship between the forces the Soviet Union deploys and the forces that the United States deploys; that they must recognize that if they take certain steps we will match them; and, that, therefore, we have R. & D. projects in development which will give us the capability to respond to certain actions of the Soviet Union which we hope they will not take. If they do take these actions then these projects will not be bargaining chips. We think we must be prepared to deploy these additional capabilities in order to maintain an appropriate balance, but we are prepared to renounce them if the other side reciprocates. We would hope they turned out to be bargaining chips and that both sides are willing to renounce their new programs.

STRATEGY BASED ON CONTEMPLATED USE OF NUCLEAR WEAPONS QUESTIONED

Senator CASE. Whether any particular initiative or suggestion is useful for this purpose is a matter we can always talk about as general philosophy. I really think what we may be coming down to, it seems to me, is whether on the other end of the scale what you are suggesting is a strategy which would make more likely the use of nuclear weapons and as a part of our regular military force. My conception is getting more strong that—except that nuclear weapons pose a deterrent against other nuclear weapons—we ought not to have strategy based upon their contemplated use. The more adequate our conventional forces, the higher the nuclear threshold—I agree with that, the latter proposition, as you know.

Secretary SCHLESINGER. Yes, sir.

Senator CASE. My views concerning the defense of Europe are related to that point.

But, in addition to the possible concern people have had about the change in our strategy being provocative in respect to the Russian perception of what we have in mind, is there not a danger that many people might think that limited nuclear war is a reasonable and perhaps less expensive option than that involving conventional forces?

Secretary SCHLESINGER. Right. Well, those are all good questions, once again, Senator Case. I am like the ancient mariner, I seem to stop one of three of your questions, but let me take a crack at them. I strongly believe that these improvements in our deterrent posture will reduce the chances of recourse to nuclear weapons. I think the only way a nuclear war is likely to get started is by miscalculation, where the other side believes that the United States might be self-deterred and that it is worth running a risk. Principally, I think the risk would be in Europe.

If they are persuaded that the United States is prepared to respond at any level, a war will not be started.

As you know, for many years there has been talk of decoupling the United States from Europe. It is part of the problem General DeGaulle had. To the extent that we have changed our targeting doctrine, we have recoupled U.S. strategic forces with the security of

Western Europe, and as long as we have that coupling action, I think that we have strengthened deterrence and, therefore, reduced the risk of nuclear war.

Part of the answer, I think, is to maintain those strong conventional forces, and once again, since you have endorsed my plea, let me embrace your position that the way to keep the nuclear threshold high is to maintain good conventional capabilities. We increase the likelihood of recourse to nuclear weapons when we weaken our conventional force structure.

Senator CASE. I could not agree with you more on that point.

Secretary SCHLESINGER. Good.

Senator CASE. But I do express the concern that what you have advocated in some quarters has made people think that you would rather readily move into low-level nuclear exchanges.

Secretary SCHLESINGER. Of course, I have spent much of my life trying to find ways of avoiding getting into nuclear war. I have repeatedly stressed, as you and Senator Javits know, and Senator Pearson knows full well from various visits, as does Senator Muskie, the need to maintain those conventional forces in Europe and maintain a balance with the Warsaw Pact forces. That is the area in which we risk actually coming to a nuclear exchange with the Soviet Union if we lose that balance. If we hold the nuclear threshold high I do not worry about it.

SOVIET VIEW OF FLEXIBLE STRATEGY

Senator PEARSON. How do the Soviets view the flexible strategy and do they have a view?

Secretary SCHLESINGER. We do not know. Whether or not they have talked about this internally, it is plain——

Senator PEARSON. [Deleted] since the announcement they have made no comment on the flexible strategy?

Secretary SCHLESINGER. They have responded to our commentary. We do not know whether they have talked internally about the possibility of these options. All that we are suggesting is that the prospective improvements in the Soviet force structure will give them the physical capabilities to consider selective options.

Now, their reaction to our position has been something of this sort—concern and surprise. The reason for surprise, as expressed to some of our people [deleted] is that they always assumed that we would target this way, therefore, why do we now say so, what is the purpose of all of this fanfare?

Senator CASE. Something like the questions you have received in Senate committees.

Secretary SCHLESINGER. I think the point that you can draw from this is that the change in the actual targeting doctrine is not so surprising to them. They may have been surprised that we had less targeting flexibility, or indicated we had less targeting flexibility, than they had thought.

Senator PEARSON. Why were they concerned? Did they see it as a counterforce?

Secretary SCHLESINGER. I think they are concerned because, in my judgment, some Soviet officials have viewed détente as a set of mile-

stones along which there has been a shift of the correlation of forces, as the good Marxist would put it, against the West and the United States and in favor of the Soviet Union, and that this was the tide of history. The concern, I think, that they express is that it has shaken their belief that the tide of history inevitably flows in the direction of strengthening the correlation of forces in favor of the Soviet Union, or the Soviet Union and its allies. It has the benefit, from my standpoint, at least, of forcing upon the Soviet Union recognition of the choice that I think we will insist that they make, to wit, whether they will come to a true accommodation with the United States, or whether the process of détente will come to be viewed by the Soviets as simply a means to shift the balance of power in their favor.

I do not think in the long run the United States, at least with its present foreign policy objectives, can accept that kind of opportunistic point of view in the Soviet Union. At the present time the Soviets are having to choose whether or not they believe in détente as a true accommodation with the West and as a continuing balance of force between the West and the East. I think that is a healthy development, but for some of them that may not be the desired development. They would prefer to have peaceful coexistence with a steady erosion of the relative——

Senator PEARSON. These speakers, are they the military people in the Soviet Union?

Secretary SCHLESINGER. Not necessarily.

Senator PEARSON. Talking [deleted] about concern and surprise?

Secretary SCHLESINGER. No, not necessarily. They are both military and civilians. Their diplomats will express these concerns, too. But once again, one never knows whether the expression of concern is directed toward the problems they perceive, or toward what they think is a problem as we might perceive it, or they could encourage us to perceive it. There is a heavy overlay, of course, of diplomatic persuasion on their part.

Senator MUSKIE. Mr. Secretary, I assumed that Senator Javits had some questions.

Senator PEARSON. Thank you very much.

QUESTIONS FOR THE RECORD

Senator MUSKIE. The staff did prepare a series of questions, some of which may have been covered by the discussion we have had, but I would like to submit them.

Secretary SCHLESINGER. Yes, sir.

Senator MUSKIE. So that we can cover those that have not been covered. I think it has been a useful discussion. [see p. 47.]

CHARTS USED AND OTHER MATERIAL

Could we have for the record, all of the charts you have used this afternoon?

Secretary SCHLESINGER. Yes, sir, you can have them for the record. I think that some of them could be declassified, but others would not be declassified. But you are welcome to all of the charts.

Senator MUSKIE. We would appreciate any other material which you might be able to make available to assess the effects of limited nuclear warfare.

NATO COMMITTEE OF NINE REPORT

Senator JAVITS. I have one question. I know the story. You and I have talked before. In the report of the Committee of Nine on NATO they had a paragraph which related to this very matter, that is, the utilization of the nuclear deterrent, both tactical and strategic, and an assessment of the facts which in effect said that if you are not ready to use it, forget it and that you have got to take the position that if you have to, you are ready to use it. That is what it is for. That is why it inhibits a conventional effort to overrun Europe. This is not a game; if the Soviets have prevailed and are in the ascendency, what you have is a supporting commitment not to use nuclear weapons?

As this record may very well be sanitized and made public, I think it would be very valuable if you could take those paragraphs and give us the Defense Department comment on them.

Secretary SCHLESINGER. Yes, sir, we would be delighted to do so.

Senator JAVITS. Specifically, because here is a prestigious statement of the case and I think it would be extremely impressive if we had the Defense Department commentary directly related to that.

Secretary SCHLESINGER. We shall amplify this commentary for the record, Senator Javits, but if I may take a minute, I would like to respond now.

You have touched upon the heart of the question, that in order to deter you must have a threat that you are prepared to implement, and that your opponent must perceive that you are prepared to implement that threat.

The reason for the change in targeting doctrine is that we know that we can persuade the Soviet Union that we are prepared to implement that threat, whereas reliance on the assured destruction doctrine could well lead the Soviet Union to believe that we are not prepared to implement the threat. It is for that reason that the changes in targeting doctrine have successfully eliminated doubts about the coupling of U.S. strategic forces with the defense of Western Europe.

Senator JAVITS. Mr. Secretary, I would like to just make one suggestion. The word "persuade" is not really the right one. We are not making an effort to bring them around or something.

Secretary SCHLESINGER. Right.

Senator JAVITS. You follow me?

Secretary SCHLESINGER. Yes, sir.

Senator JAVITS. The idea we have to persuade them, any more than they have to persuade us; we know what the story is, once the facts and the concepts are realistically spelled out.

Secretary SCHLESINGER. Yes, sir.

[The information referred to follows:]

DEPARTMENT OF DEFENSE COMMENTS ON NATO COMMITTEE OF NINE REPORT

PARAGRAPH 12, CHAPTER 2 OF THE REPORT OF THE COMMITTEE OF NINE

Report.—The European and North American members of the Alliance should begin to plan now for the systematic coalescence of Western Europe's defense capabilities—including nuclear arms—in order that Western Europe can serve

as an equal partner allied with the United States and Canada by the North Atlantic Treaty in the continued commitment to common defense in the 1980s. This implies an increase in West European military self-reliance; and it calls for the gradual and orderly devolution of certain defense responsibilities from the United States to the Western European countries—particularly to the countries of the emerging European union—or to institutions they could use or develop. Such an adjustment in European-American policies should promote the future prospects for the Alliance. Whatever the development of a European union or other comparable institutions related to defense, the fundamental reasons and aims of the Atlantic community will remain a basic interest of Western Europe and North America, although under new conditions and possibly with pacts which are now impossible and premature to envisage.

DOD comment.—The United States has consistently supported the concept of closer defense cooperation among the European Allies within the wider framework of the Alliance. The Alliance is now embarked on a major effort toward rationalization of its defense effort, taking regional considerations and national situations into account. This effort, along with similar efforts toward standardization and increased common programs, should assist Western Europe to improve its defense effectiveness so that it might gradually become militarily more self-reliant with regard to initial conventional defense. However, such self-reliance also depends on a reduction of the threat on the other side, either through negotiations or otherwise. Moreover, we would not expect that Western Europe would find nuclear self-reliance a feasible goal within the period addressed by the Report of the Committee of Nine. Nor do we see this as a necessary goal of Western Europe during this period since the United States is prepared to continue to provide the greater part of the strategic and tactical nuclear capability, which is so essential to NATO security, as part of the US participation in Alliance defense.

PARAGRAPH 13, CHAPTER 2 OF THE REPORT OF THE COMMITTEE OF NINE

Report.—The Committee recognizes in the meantime that France and Great Britain are likely to seek to prolong the effectiveness of their nuclear weapons systems and may seek further to relate their national nuclear capabalities to those of the United States. Therefore the Committee urges that these countries take measures to bring about additional coordination and mutual technical aid between the nuclear forces of France, Great Britain, and the United States. Nuclear collaboration between West European nations and the establishment of a special nuclear relationship with the United States must be constantly followed up by consultations by the Alliance members in order to make as much information as possible available to the nonnuclear European member nations and to take into account their security interests.

DOD comment.—Additional coordination and mutual technical aid between the nuclear forces of France, Great Britain and the United States would be beneficial. This proposal, however, encounters practical difficulties in that French nuclear forces are not committed to the Alliance and France does not participate in Alliance defense planning. Moreover, legislative restraints of the Atomic Energy Act impose limits on both coordination and technical collaboration by the United States with other countries. Within those nations committing forces to the Alliance there is already a high degree of consultation on nuclear weapons planning affairs; it is expected that this level of consultation within NATO nations will continue.

PARAGRAPH 14, CHAPTER 2 OF THE REPORT OF THE COMMITTEE OF NINE

Report.—In this connection the Committee believes that the Alliance must consider carefully its doctrine concerning the use of tatical nuclear weapons in the event of aggression against Western Europe. The possibility of using tactical nuclear weapons against an aggression on the European members of the Alliance must remain an option for such defense. This is the meaning of deterrence, and there is no deterrence if it be known in advance that the deterrent will under no circumstances be employed; this is just as true of tactial nuclear weapons as it is of strategic nuclear weapons. Moreover, the possibilities of deterring attack are being changed by technological developments which range from miniaturization of tactical nuclear weapons to achievement of far greater accuracy in delivery by means of laser-guided or television-guided bombs and

projectiles. It is essential, therefore, that the strategy and tactices of the Alliance should be reevaluated in light of these developments, taking into account the differentiation in character and effect of existing and forthcoming nuclear weapons for tactical use. Such rethinking should include a new study of the size, composition, and deployment of stationed and indigenous forces in Western Europe with a view to eliminating anachronisms dating from the immediate post-war period. It should be an essential part of progress toward the realignment of West European defense forces.

DOD comment.—The Department of Defense concurs in the central thrust of this proposal, namely that nuclear weapons must remain an option for NATO defense. While we see the conventional capability of the Alliance as furnishing the principal deterrent against conventional aggression, NATO's ability and willingness to use tactical nuclear weapons in the event of aggression against Western Europe remain an essential part of the NATO triad of strategic nuclear, tactical nuclear and conventional capabilities. Any potential aggressor must see in the realities of our force structure, our planning and our resolve a high degree of certainty that they will elicit a response from us that they would wish to avoid.

Overall, military planning within the Alliance, in the context of the Alliance concept of flexibility in response, deals with both the conventional and the nuclear capabilities of the Alliance. Force structure and deployment of stationed, indigenous and reinforcement forces are kept under review for development of the most effective force capabilities within available resource limits. It is our hope that the major efforts being launched on rationalization, standardization, flexible use of forces, and increased common programs will result in a significant improvement in the effectiveness of NATO defense, both conventional and nuclear, in the long term.

PARAGRAPH 15, CHAPTER 2 OF THE REPORT OF THE COMMITTEE OF NINE

Report.—The Committee calls attention to the increasing lack of balance in military capability on the northern and southern flanks of Western Europe and particularly to the Soviet naval and air buildup in the Arctic and in the Mediterranean. The Committee believes that this significant development calls for new and effective measures on the part of the Alliance.

DOD comment.—The Department of Defense is aware of these developments, and so are the Defense Ministries of our NATO allies. The governments of the NATO nations, however, are finding it increasingly difficult to provide the full amount of resources needed to meet these new challenges and must therefore turn to a more rigorous application of priorities in utilization of resources and to other efforts to permit existing and programmed forces to work together better. NATO nations can no longer afford the expensive and often wasteful practices connected with maintenance of fully independent and complete forces on a national basis but must turn increasingly to cooperation and coordination in NATO defense.

It should be noted, however, that while there may be certain regional imbalances in military capability, the forces of NATO nations continue to improve. In addition, NATO has for some time stressed planning and preparation for flexible use of reinforcements, so that the forces of the Alliance may be used where and when needed.

PARAGRAPH 16, CHAPTER 2 OF THE REPORT OF THE COMMITTEE OF NINE

Report.—In these circumstances, the Committee believes that members of the Alliance should decide what structure for European security they wish to see emerge from the current negotiations in SALT, CSCE, and MBFR. Unless a general view of the prospective situation is taken by member nations and kept in mind throughout these negotiations, then there will be risk of political disunity and damage to the European-American security relationship.

DOD comment.—We agree that there is need for a concept for long-range NATO defense which takes into account both current realities and the possible outcomes of SALT, CSCE and MBFR. The United States has proposed that NATO examine its defense under these conditions with a view to an early report to Defense Ministers for their discussion. We believe that NATO consultations in both the political and military fields will be most helpful in strengthening political unity and the European-American security relationship.

SANITIZATION OF RECORD

Senator JAVITS. I would hope, Mr. Secretary, that you allow us to disclose as much, rather than as little, as possible in sanitizing this record.

Secretary SCHLESINGER. We have. We stretched the point last year, Senator Muskie——

Senator MUSKIE. Yes, you did.

Senator SCHLESINGER. When we presented some of this material and we heartily endorse what you have said. They must see in the realities of our force structure, our planning and our resolve a high degree of certainty that they will elicit a response from us that they would prefer to avoid. That is the heart of deterrence and they must see it. They cannot be left simply to listen to our rhetoric.

Senator JAVITS. Do you want me to furnish those paragraphs?

Secretary SCHLESINGER. Yes, sir. Your office can call it in. We, of course, have the statements.

Senator MUSKIE. May we then end this with an agreement that there will be a sanitized version and reasonably soon?

Senator JAVITS. And this material will be included.

Senator MUSKIE. And also the answers to these questions?

Secretary SCHLESINGER. Yes, sir.

Senator CASE. The Chairman of the Committee of Nine is our Brother Javits.

Senator JAVITS. He knows all about it.

INCLUSION OF SENATOR CASE'S LETTER TO SECRETARY SCHLESINGER

Senator MUSKIE. If it is not clear in the record, I think that this hearing day ought to begin with the letter from Senator Case to the Secretary. That is what triggered this hearing.

Senator CASE. I want to say I have appreciated this very much.

Secretary SCHLESINGER. Very good.

Senator CASE. Very stimulating.

[Whereupon, at 4:45 p.m., the subcommittee was adjourned, subject to the call of the Chair.]

[Secretary Schlesinger's responses to additional questions for the record follow:]

SECRETARY SCHLESINGER'S RESPONSES TO ADDITIONAL QUESTIONS FOR THE RECORD

Question 1. Drawing upon the material presented in the hearing as to the effects of various limited strikes by the Soviet Union against the United States, could you give your best judgment as to the possible range of results in the following situations:

prompt casualties resulting from blast and radiation;

delayed casualties resulting from fallout;

injuries, permanent disabilities, both defects and disfigurements resulting from all direct and indirect nuclear effects;

the number of man years lost to the economy as a result of these injuries and associated efforts to rebuild local facilities;

the effect on the economy of the local area, the adequacy of local medical facilities, communication, transportation, supplies, etc.;

the amount of land lost to the area because of contamination (loss of water supplies, farm land, transportation routes, etc.);

the disruption to the national economy which would result from all of these effects; and

the psychological impact of such an event on the communities immediately affected and on the nation as a whole.

Question 2 (a) Would you spell out for the record the details of the scenarios you have mentioned?

(b) For example, what U.S. military installations and associated civilian populations would be involved? What would be the extent of the associated fallout? What civil defense posture is presupposed? To what extent do the estimates include so-called collateral or long-range effects of such attacks? To be as specific as you can, would you include the names of the installations that could be involved, plus the towns affected by the fallout?

(c) What kind of Soviet weapons were assumed in the analyses? In particular, what yields, accuracies, and reliabilities were assumed? How many weapons were targeted on each side? Which generation of missiles was assumed?

Answers. During the hearing on September 11, 1974, the Secretary of Defense discussed the results of a DOD analysis of the following limited nuclear strike scenarios:

(1) a "comprehensive" Soviet attack against all U.S.-based strategic nuclear retaliatory forces (ICBM silos, SAC bomber bases, and CONUS SLBM support bases);

(2) an incremental attack only against the U.S. ICBM force;

(3) an incremental attack only against U.S. SAC bomber bases;

(4) an attack against other selected military targets (command and control and naval facilities;) and

(5) the collateral (fallout) effects upon St. Louis of attacks (1) and (2) above.

Table 1 illustrates the "near term" collateral effects on the total U.S. population (casualties resulting from blast, initial radiation and fallout) that could result from the first three attack scenarios listed above.

The U.S. target structure used in the analysis consisted of the 1054 ICBM sites, the 46 SAC bomber bases, and the two CONUS SSBN support bases (see Figure 1).

Table 2 presents the assumptions used regarding Soviet weapons and targeting strategy in each of the 3 attack scenarios.

[Table 2 is classified and is in the committee files.]

Assumptions regarding the U.S. civil defense posture and a table illustrating fallout effects on specific urban areas are presented in the answer to question 8.

Since the casualties and other effects associated with an attack on all U.S. strategic nuclear forces would be greater than those associated with an attack against the ICBM force alone or the bomber force alone, the "comprehensive" attack scenario was selected for an assessment of "other effects" as well as the "long term" impact a limited nuclear attack could have on the U.S. economy and population as a whole. Summarized below are the results of this assessment:

TABLE 1.—NEAR TERM COLLATERAL EFFECTS ON THE U.S. POPULATION

[Casualties in thousands]

Evaluation criteria	Attack scenario		
	"Comprehensive" military attack	ICBM silo attack (1054 silos)	Bomber base attack (46 bases)
Prompt fatalities resulting from blast and initial radiation	700	150	300
Delayed fatalities resulting from fallout [1]	6,000	650	20
Injured and sick resulting from direct and indirect nuclear effects [1]	5,100	800	400

[1] Fallout effects are cumulative over a 30-day period.

U.S. TARGET STRUCTURE

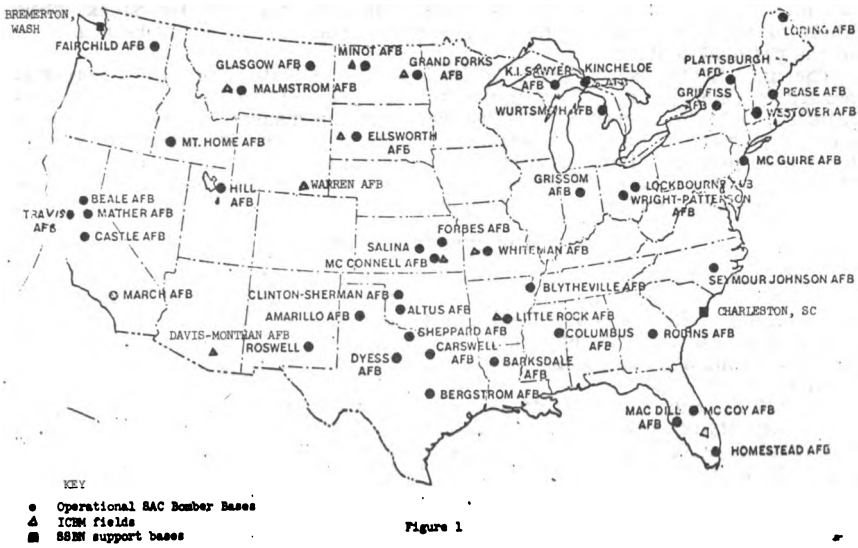

Figure 1

COMPREHENSIVE SOVIET ATTACK, "LONG TERM" AND "OTHER" EFFECTS

The scenario used to assess the near and long term collateral damage effects associated with a compresensive Soviet attack upon U.S. strategic nuclear retaliatory forces presupposed the Soviets would attempt to maximize the expected military value destroyed while making no particular effort to minimize the collateral effects of such an attack upon the U.S. populace.

The attack was assumed to occur in March (the worst case month for winds with respect to fallout), and consisted of allocating two RVs against each of the 1054 (equally valued) ICBM silos and one RV against each of the bomber and SSBN support bases. All weapons were assumed to be detonated at an optimum height of burst. A total of 2158 weapons were used in the attack, ranging in yield from [deleted] each, with [deleted] fission content.

In contrast to a "ground burst" where detonation is assumed to occur within a few feet of the ground, the term "optimum height of burst" denotes a detonation at an altitude that maximizes a weapon's lethal radius due to air induced shock. An "optimum height of burst" detonation has a lower incidence of fireball contact with the earth's surface, with a concomitant reduction in fallout propagation, as compared to a ground burst.

The U.S. populace was assumed to make maximum utilization of existing civil defense facilities. (For a more detailed explanation of the assumed civil defense posture, see the response to question #8.)

The estimated near term collateral effects of this postulated attack were 6.7 million fatalities and 5.1 million non-fatal injuries (largely due to radiation sickness). This is contrasted with the 90 million or more fatalities that would be associated with a large scale, direct attack on the U.S. urban/industrial complexes.

OVERALL SUMMARY

Compared with the effects of large scale urban/industrial/military attacks within the range of present and projected Soviet capability, the long-term collateral effects on national survival and recovery capability of this postulated attack would be relatively small.

Medical care facilities and supplies, except in some of the specific attack locations, would be scarcely damaged by the attack and would be available to care for the local sick and injured and to aid in the damaged areas. Almost 99 percent

of the nation's total manufacturing capacity could survive, although a few sectors could be reduced to 90 to 95 percent of capacity. Stocks of surplus food, stored grains, and other foods in process and in various parts of the distribution system would be unaffected by the attack. Loss of in-field crops and liverstock, while likely to result in severe economic impact in certain areas, would be negligible in the national context.

The unrestricted consumption of fresh milk and water could be a potential hazard to children and young adults in some parts of the country, but serious injuries could be prevented if effective control measures (currently known) were implemented. Fallout radiation exposure of the surviving population was too low to permit reliable estimates of long-term adverse health effects. Effects, if any, would not be expected to increase the normal occurrence of neoplasms such as leukemia and other radiation-induced defects by more than 50 percent.

ECONOMIC/INDUSTRIAL EFFECTS

Most urban/industrial systems would be unaffected by direct weapons effects and would experience little or no economic effects. The denial of industry utilization because of fallout is small and decontamination would not be an important requirement. On the basis of results from previous studies, national productivity could be within 3 percent of maximum capacity 7 days after the attack, and within 1 percent at 17 days.

Overall damage to manufacturing capacity was negligible. Almost 99 percent of the capacity of the assessed manufacturing sectors survived and were available within 15 days after the attack. Of the fraction lost, less than one-half of 1 percent was destroyed or severely damaged. A slightly greater fraction received moderate damage to a degree that denied its use for at least a year after the attack. Manufacturing sectors experiencing the greatest loss included: aircraft, 14%; copper rolling and drawing, 8%; refrigeration machinery, 8%; guided missiles, 7%.

The economies of the few local areas experiencing direct weapons effects could be severely affected by the attack. Damage to the local industrial-economic base in those areas could be heavy and necessitate a massive rebuilding effort requiring several months and possibly a year or more to complete.

LABOR LOSS

As noted above, the total injured survivors, both from direct effects and fallout, could number about 5 million. This figure is less than half of the total annual peacetime occurrence of non-fatal injuries in the U.S. and is estimated to result in a loss to the economy of up to one million man years of productive effort. Additionally, the estimated man years of effort required to rebuild the destroyed and damaged capital investments could be about one million man years. Thus, the total labor lost as a result of injuries and to rebuild damaged facilities could be on the order of two million man years.

TRANSPORTATION

The transportation system would be relatively unaffected by the attack. Surviving carriers, labor, and fuel would be capable of maintaining uninterrupted shipments. Restoration of disrupted transportation nodes or use of alternate routes could alleviate transportation bottlenecks. Within one to two weeks after the attack, radioactive decay would permit use of all but a few percent of the nation's transportation routes. Movement of vehicular or rail traffic would also remove fallout from roadways and reduce fallout exposures. Significant "decontamination" would occur in this manner. Moreover, by alternating operators of transportation equipment, emergency resupply of areas isolated by heavy fallout could be accomplished at very early times.

RESOURCES—AGRICULTURE AND LIVESTOCK

Fallout radiation may injure or kill many growing crops and food animals and may prevent farm workers from caring for them for a period of time, resulting in further losses. Specifically, radiation could deny free access to about 4 percent of the agricultural areas for up to two weeks, and 0.5 percent for up to 3 months.

In the case of the attack considered, and the time of year when it occurred (March), damage to crops would be negligible because, with the exception of winter wheat, very few crops would have been planted at the time of the attack.

Livestock, on the other hand, is more or less equally vulnerable throughout the year, and could experience losses of 10 to 17 percent of selected inventories. Had the attack occurred in June, the most critical time in terms of agricultural vulnerability, loss of wheat and some other grain crops could be comparable to that of livestock.

In summary, the effects of the attack could result in the loss of 10 to 15 percent of the production of certain agricultural crops and livestock inventories. Although the local economy in areas directly affected by the attack could be severely affected, the overall impact on the national requirement for these resources would be negligible.

SUSTENANCE—FOOD AND WATER

Massive nuclear attacks, many times more destructive than that considered herein, have provided an extreme basis for assessing whether surviving food stocks would be sufficient to carry the population through to the harvest of the following year's crops. These results could lead to considerable optimism. Although some of the supply could be lost in an attack, about 70 days supply of food is processed and available for distribution. Moreover, the national food processing and distribution system would be largely undamaged and, subject to possible radiological constraints, could resume operations immediately after the attack.

In conveniences and local shortages of food could occur in some areas during the early postattack period even though supplies nationwide would be sufficient to meet the demand. Emergency transportation of food could be a critical postattack problem requiring adaptation and modification of the transportation and distribution system. This could be required even though surviving transportation resources would be sufficient for the delivery of necessary supplies, but because constraints of fallout and difficulties in managing the transportation system might critically delay continuing food shipments.

Damage to water supply systems from the direct blast effects of nuclear weapons would be slight. Most systems would survive intact and, subject to the availability of electric power, could be operated immediately after the attack. Radiological decontamination could be implemented to restore use of fallout-denied facilities within a week to ten days. Loss of water service is likely in heavily damaged areas. The time required to restore damaged systems will depend on the degree of damage and may range from one to several weeks. Almost 7 million people could experience some loss of water service. In those cases where the outage is expected to be prolonged, it would be necessary to move people to other areas rather than to occupy housing without water service.

It may be summarized that the postattack demands for sustenance—food and water—could be adequately met. Food stocks of grains and other goods in storage and most of the country's water systems would experience negligible direct attack effects. Transportation of food, loss of electric power, and fallout contamination of water could pose potential problems.

COMMUNICATIONS

In addition to the loss from blast effects, some systems (principally AM and FM bands) are also vulnerable to the effects of the electromagnetic pulse (EMP) created by nuclear weapon explosions. Consequently, some nodes of communication within the 2-psi range of nuclear weapon detonations could be temporarily interrupted because of functional damage to equipment requiring replacement of components, and because of operational upset or temporary interruption or impairment of electrical equipment caused by opening circuit breakers or erasure of a portion of the memory of a computer. An assessment of the possible effects of EMP on communications systems would be extremely difficult because of the wide range of sensitivity of the various components in the systems and because of the uncertainty of the intensity and distribution of the EMP pulse over the systems. Mobile nets are operated on batteries and are relatively resistant to EMP.

MEDICAL CARE

Nationally, the effect of the attack on medical care resources, facilities, doctors, and supplies would be slight. Local resources in heavily damaged areas would experience substantial losses and would probably be unable to cope with the injured survivors. Because of the nature of the attack, outside assistance

from undamaged areas would be available to aid stricken communities. Relocation of injured survivors and movement of medical personnel and supplies into affected areas would be possible at very early times. This is, of course, a much different picture from the situation in a wide-spread general attack where there would be little or no undamaged medical care resources to be applied to the aid of others.

HEALTH PHYSICS AND LONG-TERM RADIATION EFFECTS

Survivors of the postulated nuclear attack would be exposed to a range of acute fallout radiation exposures during the first few days after the attack and to lower-intensity, chronic irradiation during succeeding years from long-lived fallout radionucleides in the environment.

As noted above, the effects of higher intensity, acute exposures could kill 6 million people and expose 5 million more to sublethal doses that could cause serious illness requiring up to several months of convalescence.

Of concern here, however, is the fact that lower radiation exposures, even those producing no detectable effects, may result in long-term effects that would not be evident for many years. These long-term effects may include: genetic effects, effects on growth and development, the incidence of leukemia and other neoplasms, and on life span. The amount of radiation needed to significantly increase the normal incidence of these effects is in the range of 50 to 100 roentgens.

Adverse fallout effects, if any, on the long-term health of the survivors and their progeny must be considered in terms of the possible rather than the probable because of the uncertainties in the relationship of exposure to effects, especially in view of the relatively low average fallout radiation exposure.

The acute radiation exposure as a result of the attack, averaged over all survivors, could be 7 roentgens. An additional roentgens could be received over the next several years from fallout contamination in the environment. In view of the permissible 5-roentgen annual exposure of occupational workers, the effects of the attack should not produce any marked effects. But, because of the large number of people involved, and because acute exposures, such as that received during the first several days after the attack, are more injurious than protracted exposures received later (like those used to set occupational limits), a small increase in adverse health effects could be anticipated as a result of the attack.

The possible upper limit of the radiation-induced incidences of adverse health effects that could occur may be as follows:

7,000 to 30,000 neoplasm deaths per year for several years.

8,000 leukemia deaths per year for several years.

5,000–10,000 genetic deaths per year during the first generation (<1% of the current rate).

An average life shortening of about 0.7 years.

20,000 congential malformation deaths out of 3 million pregnancies at the time of attack.

Not estimated are the additional cases of anemia, cataracts, retarded development in irradiated children, and non-fatal malformation from fetal irradiation.

PSYCHOLOGICAL IMPACT

Human behavior scientists are largely agreed that the psychological impact of a nuclear attack would result in some initial loss of confidence in government but that positive, adaptive behavior would prevail over anti-social behavior and that the survivors would support re-establishment of normal cooperative relationships at all levels of community life. The psychological impact and the time required to re-adjust in areas experiencing heavy damage or fallout would be greater. Restoration of communication links and the amount and timeliness of delivery of outside material assistance would be important factors affecting psychological re-adjustment.

Question 3. When representatives of your office met with Senator Case to discuss the collateral effects of limited nuclear war, they indicated the Department of Defense would have more thorough assessments available within a matter of weeks. Would you provide that material to the Subcommittee, with as much as possible in unclassified form for the Subcommittee's use?

Answer. The assessments referred to by representatives of the Office of the Secretary of Defense consisted of (a) an updated set of calculations of the col-

lateral effects of limited nuclear strikes, particularly in terms of *incremental levels* of attacks on ICBM silos, SAC bases, and other targets as requested by Senator Case, and (b) a more thorough assessment of the possible long term effects of a limited nuclear strike. Item (a) is provided in the briefing charts presented by the Secretary of Defense. The answers to Questions 1 and 2 provide detailed backup data for item (a) as well as the information referred to in item (b).

Question 4. The analyses are based on certain assumptions as to the targets the Russians would strike. It is clear that the damage done to the United States by a limited Soviet attack will depend on the kinds of targets which they choose to strike. Why do you feel that the Soviets might choose to attack these sites shown in your analyses and not others? How would the results of Russian attack change if the Soviets chose a different target set?

Answer. The choice of targets the Soviets might choose to strike, should they wish to initiate nuclear warfare on a limited scale, is highly speculative. It does not seem unreasonable, however, to assume one of their major objectives would be to reduce the nuclear retaliatory capability of the United States. This premise, in conjunction with Senator Case's expressed interest in the impact on the U.S. populace of limited nuclear attacks against ICBM sites and bomber bases, led to the choice of targets used in the analysis presented to the Subcommittee.

The charts presented to the Subcommittee permit one to ascertain the collateral effects of an attack on U.S. ICBM silos wing-by-wing and SAC bases base-by-base (in order of increasing degree of collateral effects) as well as individual attacks on selected command and control sites and naval bases. For example, if the Soviets chose to attack only the Minuteman missiles at [deleted] the expected number of fatalities would be on the order of [deleted] thousand as compared to 6.7 million if they chose to execute the postulated comprehensive military attack.

In general, however, it is precisely because we cannot confidently predict the targets the Soviets might choose to strike that we emphasize the need for *flexibility* in our planning and our retargeting capability, plus the need for good command/control and communications capability to permit ad hoc adjustments to the situation at hand.

Question 5. If we have no evidence presently that the Soviets are attempting to develop systems optimally designed for limited exchanges, how soon after they made such a decision might we be aware of it? How much time would they require to test and deploy a system designed for such purposes? What might happen to cause them to alter their current posture?

Answer. Implicit in the question is the tacit assumption that the Soviets do not currently possess the capability to initiate a nuclear attack on the United States having limited objectives, and that to acquire this capability would require major alterations in Soviet force design.

Although the Soviet perception of an optimally designed force for use in limited nuclear exchanges and Soviet willingness to engage in such exchanges are unknown, they currently possess this capability. That is to say, if they felt it would be in their best interest, there is no reason to believe they could not currently attack our SAC bomber bases, our strategic and general purpose naval bases, other military installations, or, for example, fire a single weapon at our submarine communications facility at Cutler, Maine.

Although the Soviets could, today, attack the entire U.S. ICBM force, it would not be a very effective attack, largely because of current Soviet missile accuracy/warhead configurations. Soviet capability to effectively attack a major fraction of our ICBM force will increase dramatically, however, as they deploy their new MIRVed ICBMs and improve their accuracy.

Question 6. How much damage could we expect from unreliabilities in the Soviet missiles launched? Is there a reasonable possibility that even if they attempted to limit their attacks to remote military sites that some random or systematic error in their navigation system would cause them to accidentally strike more heavily populated areas?

Answer. As indicated during the course of the hearing on September 11, 1974, the collateral effects from the postulated limited nuclear strike scenarios were relatively insensitive to significant changes in the assumed weapon system characteristics, with the exception of warhead detonation altitude. You will recall that the analysis showed that if all of our ICBM silos were attacked with one 1-MT weapon each detonated at an optimum height of burst, the expected number of

U.S. fatalities would be on the order of eight hundred thousand. If, on the other hand, all the Soviet firing and fuzing mechanisms were unreliable and all the weapons surface-burst, then the expected number of fatalities would approach 3 million. While such an occurrence cannot be ruled out as being totally improbable, it is highly unlikely all or even a vast majority of their weapons would fail to operate as designed.

In terms of weapon system accuracy, the analysis showed minor variations in the results for CEP degradations that could reasonably be associated with random or systematic errors. Moreover, it does not appear reasonable, based upon observed flight test data, to assume the Soviets would experience a force-wide catastrophic guidance failure that would cause them to accidentally strike more heavily populated areas than originally targeted. It is, of course, possible for one or several missiles to fail and veer off their programmed trajectories. Whether a warhead might strike a major city as opposed to not fuzing at all or landing in a cornfield, the Arctic wasteland, or the ocean, is purely speculative.

Question 7. Are our warning and command systems capable of reliably distinguishing between the launch of a few tens (or a few hundreds) of Soviet missiles and the onset of a force-wide attack? What might we do immediately in response to a warning of a limited attack?

Answer. Our warning and command systems are capable of distinguishing between the launch of a few tens (or a few hundreds) of Soviet missiles and the launch of the entire Soviet force. [Deleted].

In response to a warning of a limited attack, an Attack Warning would be transmitted from the DCPA National Warning Center to approximately 2,000 warning points located in State and local governments and key Federal installations. This warning would then be relayed to the public in accordance with local plans, employing siren systems and other locally arranged methods, including local broadcast facilities. Additionally, federal and military alerting mechanisms would be exercised to enhance the survivability of our retaliatory forces and key military and federal officials.

Question 8. In the analyses to date did you assume that we would have had sufficient warning of a possible Soviet attack to have executed any precautionary civil defense measures? If such warning was available did it come days, hours, or minutes before weapons detonated on U.S. soil? What kind of procedures were executed (i.e., evacuation of cities, fallout shelters used, etc.)? How would the results of your analyses change if you had made different assumptions about warning and civil defense?

Answer. The calculations of the collateral effects in the limited nuclear strike scenarios were done assuming the U.S. population made "maximum use of *existing* civil defense facilities." The nation-wide calculations were done using the following radiation protection profile for each metropolitan area and the rural areas:

POPULATION PROTECTION PROFILE [1]

	Metropolitan complexes	Rural areas
Protection factor	[Deleted]	
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[1] This profile is considered typical for the United States. However, individual areas could have a higher or lower protection profile than this.

The attack scenario presupposed a U.S./Soviet crisis environment (e.g., a Berlin or a Cuban missile crisis) but that civil government reaction would be maintained at a low level up to notification by the President of Advanced Alert. Following the White House announcement, the Defense Civil Preparedness Agency (DCPA) would institute an intensive instruction program on the improvement of home fallout protection and the location of the nearest fallout shelter space.

Inasmuch as no government measures were assumed to be taken to increase the amount of blast or fallout shelter space, the net effect of the publicity was estimated to make everyone generally aware of the threat of nuclear war and aware of the general shelter properties of available structures. It was estimated that as a result, no one would be expected to experience an effective average

protection factor of less than 3, and that the better shelter spaces and residential basements identified before the attack would be fully utilized. (Residential housing can be expected to provide a protection factor of 3 or greater.)

Question 9. In a speech given September 5 to the Council on Foreign Relations in Chicago, Fred C. Ikle, the Director of the Arms Control and Disarmament Agency, noted that six significant discoveries about the effects of nuclear explosions have taught us, "the more we know, the more we know how little we know."

Dr. Ikle cites as his sixth example:

> . . . a new uncertainty about what nuclear war might do to people and to the very environment on which life depends—an uncertainty that has gone unnoticed for 25 years. This is the possibility that a large number of nuclear explosions might bring about the destruction, or partial destruction, of the ozone layer in the stratosphere that helps protect all living things from ultraviolet radiation.

(a) How is this danger to the environment reflected in the studies the Department of Defense is using in its calculations?

(b) Would limited, anti-military exchanges have a lasting effect upon the ozone layer? Has that effect been assessed in any detail?

Answer. The impact of nuclear detonations on the ozone content of the upper atmosphere and the resulting effects on the earth's biosphere is a relatively new concern. However, since little information currently exists concerning this phenomena and no conclusive analyses have been completed, it is not known to what degree limited nuclear exchanges would affect the ozone layer nor how persistent the effect might be.

Atmospheric detonations of nuclear devices prior to the nuclear test ban treaty, comprising some 340 megatons in the early 1960's, may have reduced the ozone level a few percent according to current studies. However, there is some doubt about the accuracy of the measurement of the change in ozone content, and the extent to which other phenomena may have induced or contributed to the change. In addition, there is no valid rule for extrapolating beyond the empirical data to assess the possible effect of larger levels of detonations on the ozone layer.

Research required to better understand the complexities of the climatic impact of nuclear warfare is under way and is expected to provide greater insight into this phenomena over the next three years. Therefore, due to the paucity of information available, the potential adverse impact upon living things that could result from destruction of stratospheric ozone has not been taken into consideration in our analyses.

Uncertainty about the outcome of nuclear war does, of course, enhance deterrence. However, we prefer not to rely upon the ozone question, and the concomitant inconclusive understanding about the phenomena, to deter the Soviets from considering a limited nuclear strike against the U.S. in a crisis. We do prefer to enhance that deterrence by having the flexibility to respond to a possible strike at an appropriate level.

If future research leads to the conclusion that the ozone phenomena would cause a large scale catastrophe from even limited nuclear strikes, we would welcome the contribution that that knowledge would make to the deterrence of such strikes.

Question 10. The other five examples cited by Dr. Ikle were (1) the unpredictability of nuclear fallout, (2) the human meaning of fallout (following a 1954 test), (3) the possible massive disruption in worldwide communication, (4) the damage to distant electronic equipment and computers, and (5) the "fratricide" effect in nuclear attacks in which some attacking warheads may destroy or divert others.

Dr. Ikle concludes:

> . . . Each of these discoveries tore a hole in the facile assumptions that screened the reality of nuclear war. Each brought a new glimpse into the cauldron of horrors. What unexpected discovery will be next? What will surprise number seven be? Number eight?

(a) How sanguine are you that there will not be further discoveries which may change drastically your perceptions of the effects of nuclear war?

(b) Do not these uncertainties in themselves raise serious questions as to the predictability and controllability of nuclear warfare?

Answer. One can never be sure what discoveries may be made in the future that would drastically change the perceptions of nuclear warfare. We are hope-

ful that surprise number seven or eight or . . . will be such that the implications of using just one, let alone many, nuclear devices would be sufficient to deter the most irrational adversary. Until that time, however, we must ensure that we have the forces and procedures that provide us with alternatives appropriate to the nature and level of the provocation. This means having the plans and command and control capabilities necessary to enable us to select and carry out the appropriate response without necessarily having to resort to mass destruction.

The uncertainties in known nuclear phenomena and weapon system performance, let alone those associated with discoveries which may be made at some future date, most certainly raise serious questions as to the predictability and controllability of nuclear warfare. It is these very uncertainties that contribute to deterring a rational leader from committing his country to possible annihilation through the initiation of nuclear war. This self-deterrence is further strenghtened if a potential adversary knows the President of the U.S. would be capable of responding in kind to any level of provocation.

It should be clearly understood that the Defense Department is not advocating a strategy which makes the initiation of limited nuclear war an attractive proposition. The point Secretary Schlesinger's briefing is intended to bring home is that the U.S. would be much worse off if it responded to a Soviet limited nuclear strike by retaliating against Soviet cities, bringing upon itself a Soviet counter-strike on U.S. cities and the damage depicted in the first column of vu-graph 10.

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from undamaged areas would be available to aid stricken communities. Relocation of injured survivors and movement of medical personnel and supplies into affected areas would be possible at very early times. This is, of course, a much different picture from the situation in a wide-spread general attack where there would be little or no undamaged medical care resources to be applied to the aid of others.

HEALTH PHYSICS AND LONG-TERM RADIATION EFFECTS

Survivors of the postulated nuclear attack would be exposed to a range of acute fallout radiation exposures during the first few days after the attack and to lower-intensity, chronic irradiation during succeeding years from long-lived fallout radionucleides in the environment.

As noted above, the effects of higher intensity, acute exposures could kill 6 million people and expose 5 million more to sublethal doses that could cause serious illness requiring up to several months of convalescence.

Of concern here, however, is the fact that lower radiation exposures, even those producing no detectable effects, may result in long-term effects that would not be evident for many years. These long-term effects may include: genetic effects, effects on growth and development, the incidence of leukemia and other neoplasms, and on life span. The amount of radiation needed to significantly increase the normal incidence of these effects is in the range of 50 to 100 roentgens.

Adverse fallout effects, if any, on the long-term health of the survivors and their progeny must be considered in terms of the possible rather than the probable because of the uncertainties in the relationship of exposure to effects, especially in view of the relatively low average fallout radiation exposure.

The acute radiation exposure as a result of the attack, averaged over all survivors, could be 7 roentgens. An additional roentgens could be received over the next several years from fallout contamination in the environment. In view of the permissible 5-roentgen annual exposure of occupational workers, the effects of the attack should not produce any marked effects. But, because of the large number of people involved, and because acute exposures, such as that received during the first several days after the attack, are more injurious than protracted exposures received later (like those used to set occupational limits), a small increase in adverse health effects could be anticipated as a result of the attack.

The possible upper limit of the radiation-induced incidences of adverse health effects that could occur may be as follows:

7,000 to 30,000 neoplasm deaths per year for several years.

8,000 leukemia deaths per year for several years.

5,000–10,000 genetic deaths per year during the first generation (<1% of the current rate).

An average life shortening of about 0.7 years.

20,000 congential malformation deaths out of 3 million pregnancies at the time of attack.

Not estimated are the additional cases of anemia, cataracts, retarded development in irradiated children, and non-fatal malformation from fetal irradiation.

PSYCHOLOGICAL IMPACT

Human behavior scientists are largely agreed that the psychological impact of a nuclear attack would result in some initial loss of confidence in government but that positive, adaptive behavior would prevail over anti-social behavior and that the survivors would support re-establishment of normal cooperative relationships at all levels of community life. The psychological impact and the time required to re-adjust in areas experiencing heavy damage or fallout would be greater. Restoration of communication links and the amount and timeliness of delivery of outside material assistance would be important factors affecting psychological re-adjustment.

Question 3. When representatives of your office met with Senator Case to discuss the collateral effects of limited nuclear war, they indicated the Department of Defense would have more thorough assessments available within a matter of weeks. Would you provide that material to the Subcommittee, with as much as possible in unclassified form for the Subcommittee's use?

Answer. The assessments referred to by representatives of the Office of the Secretary of Defense consisted of (a) an updated set of calculations of the col-

lateral effects of limited nuclear strikes, particularly in terms of *inoremental levels* of attacks on ICBM silos, SAC bases, and other targets as requested by Senator Case, and (b) a more thorough assessment of the possible long term effects of a limited nuclear strike. Item (a) is provided in the briefing charts presented by the Secretary of Defense. The answers to Questions 1 and 2 provide detailed backup data for item (a) as well as the information referred to in item (b).

Question 4. The analyses are based on certain assumptions as to the targets the Russians would strike. It is clear that the damage done to the United States by a limited Soviet attack will depend on the kinds of targets which they choose to strike. Why do you feel that the Soviets might choose to attack these sites shown in your analyses and not others? How would the results of Russian attack change if the Soviets chose a different target set?

Answer. The choice of targets the Soviets might choose to strike, should they wish to initiate nuclear warfare on a limited scale, is highly speculative. It does not seem unreasonable, however, to assume one of their major objectives would be to reduce the nuclear retaliatory capability of the United States. This premise, in conjunction with Senator Case's expressed interest in the impact on the U.S. populace of limited nuclear attacks against ICBM sites and bomber bases, led to the choice of targets used in the analysis presented to the Subcommittee.

The charts presented to the Subcommittee permit one to ascertain the collateral effects of an attack on U.S. ICBM silos wing-by-wing and SAC bases base-by-base (in order of increasing degree of collateral effects) as well as individual attacks on selected command and control sites and naval bases. For example, if the Soviets chose to attack only the Minuteman missiles at [deleted] the expected number of fatalities would be on the order of [deleted] thousand as compared to 6.7 million if they chose to execute the postulated comprehensive military attack.

In general, however, it is precisely because we cannot confidently predict the targets the Soviets might choose to strike that we emphasize the need for *flexibility* in our planning and our retargeting capability, plus the need for good command/control and communications capability to permit ad hoc adjustments to the situation at hand.

Question 5. If we have no evidence presently that the Soviets are attempting to develop systems optimally designed for limited exchanges, how soon after they made such a decision might we be aware of it? How much time would they require to test and deploy a system designed for such purposes? What might happen to cause them to alter their current posture?

Answer. Implicit in the question is the tacit assumption that the Soviets do not currently possess the capability to initiate a nuclear attack on the United States having limited objectives, and that to acquire this capability would require major alterations in Soviet force design.

Although the Soviet perception of an optimally designed force for use in limited nuclear exchanges and Soviet willingness to engage in such exchanges are unknown, they currently possess this capability. That is to say, if they felt it would be in their best interest, there is no reason to believe they could not currently attack our SAC bomber bases, our strategic and general purpose naval bases, other military installations, or, for example, fire a single weapon at our submarine communications facility at Cutler, Maine.

Although the Soviets could, today, attack the entire U.S. ICBM force, it would not be a very effective attack, largely because of current Soviet missile accuracy/warhead configurations. Soviet capability to effectively attack a major fraction of our ICBM force will increase dramatically, however, as they deploy their new MIRVed ICBMs and improve their accuracy.

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Answer. The impact of nuclear detonations on the ozone content of the upper atmosphere and the resulting effects on the earth's biosphere is a relatively new concern. However, since little information currently exists concerning this phenomena and no conclusive analyses have been completed, it is not known to what degree limited nuclear exchanges would affect the ozone layer nor how persistent the effect might be.

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Research required to better understand the complexities of the climatic impact of nuclear warfare is under way and is expected to provide greater insight into this phenomena over the next three years. Therefore, due to the paucity of information available, the potential adverse impact upon living things that could result from destruction of stratospheric ozone has not been taken into consideration in our analyses.

Uncertainty about the outcome of nuclear war does, of course, enhance deterrence. However, we prefer not to rely upon the ozone question, and the concomitant inconclusive understanding about the phenomena, to deter the Soviets from considering a limited nuclear strike against the U.S. in a crisis. We do prefer to enhance that deterrence by having the flexibility to respond to a possible strike at an appropriate level.

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